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Railway Results Show Improvement

By the Editor

Better Earnings in Latter Months

THE year 1928 proved to be a more satisfactory one financially for the railways than it promised to be during the early part of it. The increase in net operating income in October was extraordinary, and made the total net earned in the first ten months larger than in the corresponding part of any previous year, excepting 1926. The car loading statistics for subsequent weeks indicate that earnings throughout the last quarter of the year were relatively large. It seems probable that after having been a poor year for most railways until two-thirds of it was past, 1928 will prove to have been relatively the best year most railways have had since the war, excepting 1926.

The total net operating income of the Class I roads in the first ten months of the year was $986,000,000, or at the annual rate of 4.73 per cent on their property investment. The only years since the railways were returned to private operation when relatively better results for the first ten months were reported, were 1925 and 1926.

Improved Results on Western Roads

THE western group of roads made relatively the greatest improvement in earnings. In the first ten months of the year the railways of both the Pocahontas and Southern regions suffered declines in net operating income. There was a small increase in the eastern district. The net operating income of the railways in all the three regions of the western district substantially increased. The total net earned in ten months in the western district was $388,000,000, an increase of $11,000,000 over the corresponding part of 1926 and of $46,000,000 over the corresponding part of 1927. The total operating revenues of $1,981,000,000 of the western roads during these months were the largest in their entire history excepting in 1920.

Up to the end of October the eastern group of roads (including the Pocahontas lines) had earned at the annual rate of 5.10 per cent, the southern group 4.19 per cent and the western group 4.48 per cent. When complete results for the year are available it will probably be found that the year was the worst for the southern roads excepting 1921 and the best for the western roads since they were returned to private operation.

Prospective Traffic

DURING the last one-third of the year freight traffic was larger than in any previous year with the possible exception of 1926. This augurs favorably for at least the first half of 1929. A substantial increase in freight business in the closing months of a year usually has been the forerunner of a large business during the next year, and at the present time it seems not improbable that the record breaking freight business of 1926 will be exceeded in 1929.

In discussing prospective traffic a year ago the *Railway Age* anticipated that shipments of coal would be comparatively small in the early part of 1928, but would show a large increase in the latter part of the year. This forecast proved to be well founded, but the total coal traffic of the year was smaller than it seemed reasonable to expect. Total shipments of bituminous last year were the smallest since 1922, excepting in 1924. Up to December 8 they amounted to only 462,000,000 tons, as compared with an average of 500,000,000 tons during the corresponding parts of the preceding five years.

Gross Declines, Net Increases

THE increasing use of substitutes for coal and the increasing efficiency in the use of coal itself apparently have practically or entirely stopped the increase in its consumption for domestic, industrial and transportation purposes. In view, however, of the fact that the shipments of last year were about 7 per cent less than the average during the preceding five years, it seems not unreasonable to assume that storage supplies at the beginning of this year were unusually small, and that during the present year the volume of coal moved by rail will be larger than in either 1927 or 1928.

The total operating revenues of the railways last year were smaller than in 1923, 1926 or 1927, but their net operating income was greater than in either 1923 or 1927. This directs attention to the fact that

railway managers are now called upon to solve problems that differ widely from those with which they were confronted before the war.

From the time the country emerged from the effects of the panic of 1893 until 1920 both passenger and freight business almost constantly increased, and the most vital problem of railway managements was that of enlarging capacity. In every year since 1923 passenger business has declined, the largest decline having occurred in 1928. Passenger earnings in the first ten months of last year were $200,000,000 less than in the corresponding part of 1923. Total operating revenues were only $182,000,000 less, because freight earnings were larger than five years before. The increase during the five years in the number of tons of freight carried one mile was, however, only about 3 per cent, which was less than an average year's increase before the war.

The tendency of total earnings to increase slowly, owing to losses of passenger business and to failure of freight business to grow as formerly, and to the tendency of rates to decline, has made it necessary for railway managements to devote increasing study and effort to improvements in the properties and in operating methods which will effect economies. The success that has been attained is indicated by the fact that total operating expenses were less last year than in any year since 1922. In the first ten months of 1928 they were $133,000,000 less than in 1927, $174,000,000 less than in 1926, and $408,000,000 less than in 1923. Total maintenance expenses were $72,000,000 less than in 1927 and $234,000,000 less than in 1923. Transportation expenses were $65,600,000 less than in 1927 and $226,000,000 less than in 1923.

The Cost of Operating Economies

SUCH great reductions in operating expenses cannot be secured, however, without the incurring of costs that largely offset them. Allowing for retirements of property, the investment in the railways last year was about $4,000,000,000 greater than in 1923. This huge increase in investment is the price that has had to be paid for the economies in operation that have been made as well as for the great improvement in the service rendered to the public. Prices are lower than five years ago, but wages are higher, and it is questionable whether, without the large investment made in improvements, operating expenses would have been any less than in 1923.

The Interstate Commerce Commission has held that the railways are entitled under the Transportation Act to a return of 5¾ per cent upon a fair valuation of their properties. In order to have earned a return of 5¾ per cent upon the *increase* in investment in 1928 over 1923, the railways should have got an increase in net operating income of $230,000,000. The actual increase over 1923 in net operating income in the first ten months of the year was about $160,000,000, and in the entire year probably was less than $200,000,000.

In other words, the *increase* in net operating income over that of 1923 probably was not quite sufficient to yield a return of 5 per cent upon the *increase* made meantime in the total investment in the properties, which means that the railways are not earning a "fair return" even upon new investment. In the first ten months of 1923 they earned at the annual rate of 4.56 per cent upon their total investment and in the first ten months of 1928, as already stated, at the annual rate of 4.73 per cent.

Savings in Labor Costs

THE cost of labor constitutes more than one-half of railway operating expenses, and therefore when large economies are effected they are usually due principally to a reduction in the amount of labor employed in producing a given amount of transportation. The amount of labor employed by the railways during the last five years has declined. Invested capital, as represented by physical facilities, has played an increasing part in the carriage of goods and passengers, and human exertion a declining part. The result has been that, although the average wage per hour has increased the total wages paid have not correspondingly increased but have been less in every year than in 1923. Total wages paid in the first nine months of 1928 were about $2,136,600,000. This was about $85,000,000 less than in the corresponding part of 1927, and about $145,000,000 less than in the corresponding part of 1923.

The savings actually effected in labor costs have been much larger than these figures indicate. The average hourly wage in the first nine months of 1923 was 61.3 cents; in 1927, 65.4 cents, and in 1928, 66.7 cents. The number of hours for which labor is paid has, however, shown large reductions. If the railways in the first nine months of 1928 had, at the average hourly wage of last year, paid for as much labor as in 1927, their total wages would have been $128,000,000 more than they were, and if, at the 1928 hourly rate, they had paid for as much labor as in 1923, their total wages would have been $347,000,000 more than they were.

Of course, in considering these figures, allowance must be made for changes in the volume of traffic, in the amount of maintenance work done and various other differences in conditions, but even when all such factors are considered it remains unquestionably true that the railways have been in the front rank of the industries of the country which have effected large economies by making improvements in their plants, organizations and operating methods.

Another Big Year for Roadway

WHILE 1928 was not as active a year in the roadway department as the one immediately preceding, the decreases in both capital and operating expenditures were relatively small. Although the mileage of new lines built was the largest that we have reported since

1916, this high total was due primarily to the completion during the year of projects started in 1927. At the same time, expenditures for second track and other roadway improvements were, in general, less, with the result that the total capital expenditure for roadway showed a decline of approximately 10 per cent. The proportion of the total capital expenditures that went for improvements in roadway and other permanent structures was, however, the highest for many years, being nearly 67 per cent.

In the maintenance of the roadway facilities, the same tendency to reduce expenditures was evident, although to a lesser degree, the expenditures for maintenance declining 3 per cent as compared with 1927. This did not necessarily involve a corresponding reduction in the amount of work done, for, with the steadily increasing use of labor-saving machinery and the reduction in the labor turn-over, the efficiency of the forces is increasing.

Despite the slight decrease in expenditures, the condition of the tracks and structures is probably as good as a year ago, the rapid extension of the use of heavier rail and the marked increase in the application of ballast (expenditures for the latter *increased* 20 per cent last year in the face of the general reduction in all expenditures) being indicative of the general trend.

The strengthening and improvement of the roadway structure are responsible in a large measure for the increased efficiency of operation recorded in recent years. The orders already placed for rails, and the information available regarding the plans of the roads for 1929, indicate that this policy will be continued on an even more liberal scale during the year now opening.

Signaling Aids Train Operation

THE construction of automatic block signals and interlocking facilities in 1928 was about the same as the average for the last ten years. The installation of automatic block signals in the United States and Canada was substantially less than in the record years 1926 and 1927, however, being 3,121 miles, as compared with 4,992 miles in 1926 and 5,127 miles in 1927. The number of new interlocking plants installed was 128. Several roads equipped sections of their lines with the centralized control system for the remote control of power-operated switches combined with signals to direct train movements without written train orders. The Pere Marquette, the Texas & Pacific, the Boston & Maine and the Denver & Rio Grande Western are a few of the roads most active in this way during 1928.

A decided activity in the construction of remote control power switches was evident. The simplicity of the circuits developed for the centralized control systems makes them readily adaptable for the control of switches at the ends of double track, or passing tracks, on grades where it is desirable to eliminate stops for heavy trains. At certain locations at the ends of double track, at the leaving end of yards, etc., where the train movements on one route predominate, increasing favor is being shown for the use of the buffer type spring switch. During 1928 improvements were made in the application of spring switch mechanisms that permit the switch to be thrown by hand without the delay incident to working the buffer feature, this improvement facilitating switching movements. Another advantage of the new type is that the switch may be trailed through in either position, the spring feature and the buffer being operative for either position. In interlocking, the most important trend is toward the elimination of derails on main tracks of multiple-track lines. Interlocking equipment is being simplified without sacrificing safety. For example, on one large passenger terminal plant now under construction, no lock rods are to be used on the power switch machines, the locking being included as a function of the operating mechanism.

On account of the action pending since August, 1927, before the Interstate Commerce Commission, concerning the adequacy of existing train control and signal installations, many roads have hesitated to authorize signaling installations. Now that the commission has decided not to require by order at this time any further installations of train control, it is to be expected that the carriers will proceed during 1929 with signaling programs that have been held in abeyance.

Mechanical Developments in 1928

MAJOR mechanical department efforts during 1928 were directed toward improving the general condition of cars and locomotives. The success achieved along this line has had a direct bearing on operating efficiency, as evidenced by the heavier train loads handled, increased train speeds, reduction in unit fuel consumption, reduced train delays due to failures, etc.

While a notably poor year from the point of view of equipment installations, 1928 witnessed a general tightening up in equipment maintenance operations. The result of carrying out progressive shopping programs has been reflected not only in increased operating efficiency, but in more economical conduct of the mechanical maintenance work itself. In numerous cases the improvement in locomotive condition, for example, has resulted in a substantial decrease in the cost of locomotive repairs per mile, increased mileage between shoppings, reduced locomotive failures and substantially increased percentage of serviceable locomotives. The application of steel roofs, steel ends, heavier underframes and the general strengthening of weak car designs has reduced car maintenance costs per mile, lessened failures and also increased the percentage of serviceable cars.

Due largely to the retirement of obsolete rolling stock and the general improvement in equipment condition, mechanical maintenance operations on many roads have been conducted with substantially reduced shop forces and consequently reduced unit and aggregate costs. Minor repair shops have been closed and the installation of modern shop equipment at system repair shops has been a contributing factor in reducing costs.

In the design of new locomotives, continued emphasis has been placed on high boiler pressure, ample boiler capacity and high sustained horsepower output. Several notable examples of this trend could be cited, including the Northern Pacific 2-8-8-4 locomotive, the largest steam locomotive yet constructed. Experiments have been continued with oil-electric motive power, the most recent development of which is the 2660-hp. double-unit locomotive recently placed in operation by the Canadian National. The increased popularity of gas-electric rail equipment for local main line as well as branch line service has been demonstrated by the large amount of equipment purchased for this purpose, and at least one road is planning to handle 1,000-ton mixed freight trains with this type of power.

The work of the Mechanical Division during 1928 in standardizing locomotive details and in approving general designs of standard hopper and automobile box cars, deserves special commendation. Further and more extensive tests are being made of roller bearings in car design, also of aluminum alloy and of cast steel frames and fittings, particularly for cars handling corrosive materials.

The Equipment Market

THE trend toward more artistic, comfortable and convenient passenger equipment which was noticeable in 1927, has continued throughout 1928. Both the railroads and the car builders have employed special artistic talent in designing car interiors, and securing harmonious color schemes and artistic decoration, and have produced equipment that should satisfy the most extreme demands.

The enormous purchases of equipment and supplies by the railways make them one of the largest markets of the country. For some years they have been a good market for manufacturers of machinery, devices and materials used in maintaining and improving roadway and other permanent structures, but a comparatively poor market for manufacturers of locomotives and the devices used on them.

The numbers of locomotives installed and retired as reported by the American Railway Association include equipment that has been rebuilt. In the first ten months of last year the number of locomotives installed was only 1190, as compared with an average of 1691 per year in the preceding four years. The number retired was 2600 as compared with an average of 2313 in the preceding four years.

The number of freight cars installed in the first ten months of the year was 47,433 as compared with an average of 98,966 in the preceding four years. The number retired was 69,095 as compared with an average of 87,428 in the preceding four years.

It is a much mooted question as to when orders for equipment probably will increase. This, of course, depends upon actual and prospective increases in traffic, in earnings and in the efficiency with which equipment is used. The prospects of traffic and earnings now seem to be better than at any time since the early part of 1926. Efficiency in the use of equipment is, however, greater now than ever before and is constantly increasing. This is illustrated by the fact that in October a new high record of 36.2 miles was made in average miles per car per day.

In spite, however, of the efficiency with which equipment was used the net surplus of freight cars reported last fall was the smallest since 1923 excepting in 1926. The minimum net surplus reported in the fall or early winter in each of the last five years was as follows: 1924, 92,596; 1925, 103,193; 1926, 77,659; 1927, 134,688; 1928, 85,745. This does not show that the railways need more cars, but it indicates that they might need them if the peak freight business of 1929 should be substantially larger than that of 1928.

Another fact of some importance to be considered is that retirements of freight cars have recently been made at a declining rate. The number retired in 1927 was the smallest since 1921, and apparently there was a further decline in 1928. It seems reasonable to assume that after a comparatively long period of small retirements they will show an increase if earnings warrant it, and that installations of new equipment will increase.

On the whole, it seems probable that purchases of equipment will increase in 1929, although it would be somewhat hazardous to estimate the probable amount of the increase. Both orders and inquiries during the closing months of last year gave some encouragement to the manufacturers.

The State of Public Sentiment

THE railways are confronted with a public sentiment which may, we believe, be said, without exaggeration, to be unprecedented. In spite of the seemingly friendly feeling of the public, they are probably subject to as many influences that endanger their future as they ever were. Many examples might be given. The Hoch-Smith resolution, as interpreted by the Interstate Commerce Commission, contemplates the use of regulation of freight rates to reduce the burden of transportation charges on industries that are depressed and to increase it on those that are prosperous. It is much better adapted, however, to cause reductions of freight rates than to cause compensating increases. Nevertheless, it is generally believed that, for political reasons, an effort to get it repealed would be futile.

Not satisfied with this resolution's injunction to the commission, the Senate, in its last session, passed another which might have been construed as directing a reduction of grain rates to the same basis as those of the Canadian roads. The commission, in a report to the Senate, has very courageously and completely shown that, because of differences between governmental railway policies in Canada and the United States, it would be unjust to establish the Canadian grain rates in the United States. Whether this will end the matter remains to be seen.

Commercial travelers' organizations have continued their agitation for abolition of the sleeping and parlor car surcharge, and there has been danger that the legislation sought by them would be passed, although the surcharge was authorized by the commission and the justification for it repeatedly has been shown. Nobody has suggested where the railways should get revenues to compensate them for its proposed abolition.

Attitude of Waterway Advocates

PERHAPS the most remarkable of all evidences of the public attitude toward transportation has been the recent revival on an unprecedented scale of the agitation for development of inland waterways and for government ownership and operation of the boats upon them. It is plainly an economic question of great importance whether increased transportation by inland waterways will reduce the total cost of transportation, including what the public must pay in taxes. It is also a very important question whether the government, at the taxpayers' expense, should engage in water transportation in competition with the railways.

Nevertheless, the enthusiasm and intolerance of the waterway advocates have been so great that they have practically denied to the railways any right to question the desirability of waterway development and government operation. The Interstate Commerce Commission has held that the Denison bill directs it to establish through routes and rates between the railways and inland waterways without previous hearings. We believe this is the first time it has been held that the commission should issue orders regarding railway rates without previous hearings, and if this interpretation of the act is correct it is almost certainly unconstitutional. But the railways were virtually threatened with surcharge legislation if they attacked the constitutionality of the Denison act, and consequently decided not to do so.

The agitation for waterway development and for government operation upon the waterways is not confined to the Mississippi valley. It has extended throughout the country, including the part through which the Columbia river flows. The *Railway Age* recently published an editorial attempting to show that the total cost of transportation by inland waterway was greater than by rail, and that therefore the execution of the various projects for waterway development would increase rather than reduce the total burden of transportation costs to be borne by the public. The Portland (Ore.) Journal published an editorial commenting upon our editorial in which it said: "If the railroads intend to open a vendetta upon waterways improvement they are ill-advised." It added: "President-elect Hoover has committed himself to a program of waterways improvement. It includes the Mississippi, the St. Lawrence and the Columbia. It will be strange if the railroads seek to undertake war upon the next administration and a waterway program of immense benefit to the people of the United States."

Similarly, one of the principal officers of one of the largest associations of commerce in the country said in a recent letter to the *Railway Age*: "I have personally discussed these (waterway) problems with several leaders of both Houses of Congress, and I believe the railroads will adopt a very short-sighted policy if they try to discourage the economic importance that will flow to the country from the development of these natural resources. I venture to suggest that any such attitude will certainly foster a hostile interest when many subjects dealing with other phases of transportation peculiarly of interest to rail carriers are considered in the future."

Railway Problem Not Solved

WITH the public apparently satisfied with regulations under which the railways constantly fail to earn a fair return; with the pressure for reductions of rates and advances in wages continuing; with government subsidized competition of other means of transportation increasing; and with the sentiment for waterway development and government operation on waterways so strong in some quarters that it tries to dictate to the railways what their attitude shall be regarding a subject of so much interest to them, it is evident that the "railroad problem" is far from solved.

There is much, however, that may be said on the other side. The general attitude of the public toward the railways is really friendly. The trouble is that the public, and even business men, do not understand transportation economics. They need education and always will, as long as the railways are subject to regulation. It is a part of the function of railway managements to see that they are educated. The progress that has been made in changing public sentiment shows that the task is not an impossible one.

Railway employees, being human, still seek advances in wages. It cannot be questioned, however, that employees are working more efficiently than ever before. Furthermore, there apparently is beginning among them an awakening to a realization of the fact that when the government subsidizes other means of transportation it helps to deprive railway employees of their jobs, and the time may come when realization of this fact will become so general that railway employees will become an important influence in defending the railways.

Freight business may not grow as rapidly as in the past, but over periods of years it is still growing. The possibilities of increased economy in operation, especially through the wise investment of capital, are not exhausted. The immediate prospects of the railways are comparatively good. Their managements can, therefore, regard the New Year with comparative optimism, although, if well-founded, this optimism must be based partly upon a recognition of the fact that as long as the railways are subject to government regulation they will have constantly and vigorously to resist movements inimical to their prosperity and development.

Tendencies in the Railway Field

Railway executives expect business to be good—Capital expenditures may increase—concern expressed regarding regulation

RAILWAY executives anticipate that 1929 will be a comparatively good year for the railways in point of traffic and earnings. They expect that expenditures for improvements corresponding to those within recent years, and perhaps somewhat larger than within the last year, will be made, especially if business equals its present promise. They expect, however, that, under present conditions, improvements tending to reduce operating costs will be made more largely than for the purpose of providing increased capacity.

They regard with considerable concern prevailing public policies affecting railways, and agree with those who have expressed the opinion that if these policies are not altered the trend of transportation conditions will be similar to what it was during the pre-war period.

These are the views indicated by articles written by executives of important lines in all parts of the country and published herewith. These articles were received in response to a letter from the *Railway Age* in which the executives of a selected list of large lines in various territories were asked to give their views, and preferably to express them in response to the following questions:

Trend in Freight Volume

"1.—Do conditions in your territory indicate a larger or smaller freight business in 1929 than in 1928? Has the comparatively small growth of freight business within recent years been due in a substantial measure to competition by highway and water?

Capital Expenditures

"2.—Will railway capital expenditures probably be relatively as large in 1929 as within recent years? The total freight car surplus became the smallest recently that it has been for five years. Since 1923 on most roads capital expenditures for the improvement of roadway and structures have increased in proportion to those made for new equipment. Will this tendency probably continue in the immediate future? Is the present capacity of the railways such that capital expenditures will be devoted in relatively larger measure to making improvements primarily to effect economies in operation rather than to effect increases of capacity?

The Future Effect of Present Public Policies on the Railroads

"3.—Do you agree with the view which has been publicly expressed by some railway executives that prevailing tendencies cause serious danger that railroad conditions will become similar to what they were a decade or more ago, with the result that the railways will become unable to continue to render their present unprecedentedly good service? If so, what measures should be adopted as respects (a) competition of other means of transportation, (b) determination of wages, (c) taxation, (d) adjustment and regulation of rates, or other matters to protect revenues and make possible the improvements in service the public constantly demands?"

More Liberal Policy Must Be Adopted Regarding Rates

By H. A. Scandrett

President, Chicago, Milwaukee, St. Paul & Pacific Railroad

TWO good crops in the northwest last year—this year and have put that territory in better condition than it has been since the war. If we have good crops next year I believe our freight revenue in 1929 should equal that of 1928.

Concerning the relative growth in freight business within recent years: For the five principal roads serving the northwest territory the growth, as measured in revenue net ton-miles, for the seven years 1911 to 1917, inclusive, was approximately 2.4 billions per year. This is fairly indicative of the growth prior to the war. For the seven years 1922 to 1928, inclusive, the growth has been approximately 0.7 billions per annum. I attribute this reduction in the rate of growth that we were enjoying prior to 1918 to the economic disturbance caused by the war, and which was more acutely felt in the northwest territory, and to competition by water through the Panama canal.

The growth in the business through the Panama canal has been very marked since 1920. In that year it aggregated 9,374,499 long tons, while for the fiscal year ended June 30, 1928, it was 29,630,709 long tons. Of course much of this tonnage would not have moved via rail lines if the canal had not been built, but a substantial part of it would have been transported by rail. I have not before me the United States Intercoastal figures for 1920, but for the fiscal year ended June 30, 1921, this movement via the canal aggregated 1,372,388 long tons, while for the fiscal year ended June 30, 1928, it had increased to 10,067,392 long tons. I think the full significance of these figures is more fully realized if stated in net ton-miles. This intercoastal tonnage for 1928, had it moved across the United States, would have produced 33,826,437,120 net ton-miles.

While competition of motor trucks operating on highways has cut into the traffic of the carriers, there are the offsetting benefits to rail traffic resulting from the transportation of auto trucks, and parts, their fuel and supplies, and the opening up and making available to the railroads of a wider territory. We have no reliable statistics to measure the net loss as a result of highway motor truck operation.

While we have not yet made up our budget for 1929,

we expect that capital expenditures will equal those in 1928.

Our capital expenditures for equipment have declined since the high point of 1923, while the gross capital expenditures for road have increased. I attribute this in part to the necessity of putting equipment in condition after the return of the property from federal control, and to its more intensive use, as reflected by the yearly increase in average miles per car per day, and the longer engine runs. Another factor is the decline in passenger business which has restricted the purchase of new passenger equipment.

The questions propounded by you are so far-reaching, and go so deeply into the economic question of whether highways and waterways shall be developed for common carrier purposes, in competition with the railroads, at the expense of the state or nation, for the benefit of the communities and territory they serve, that they cannot be discussed adequately within the scope of this letter. However, I do feel that the railroads in the northwest cannot continue in successful operation, provide efficient service, and meet the growing needs of the communities they serve, on the rate of return on investment to which they have been limited since the Transportation Act was enacted. For the first time since its enactment the group earnings of the Northwestern Region have, in the current year, exceeded 4 per cent. If the roads are to continue under private operation and provide adequate transportation to meet the needs of the country a more liberal policy must be adopted in respect to rates. With such a policy in effect I believe the roads can meet successfully competition of other forms of transportation, but such competitors should be made subject to regulation of state and national authorities.

"Living in Faith and Hope"

By Fred W. Sargent

President, Chicago & North Western Railway

I THINK a little larger business is indicated for 1929 than in 1928. I also believe that the comparatively small growth in freight business in recent years has been caused to some extent by truck and water competition.

Railway capital expenditures should be relatively as large in 1929 as in 1928. This applies to both roadway and equipment. Indeed, I think as to equipment they should be somewhat larger, but the question as to what the railroads will in fact do depends upon the answer to your third question, in which you enquire as to whether the prevailing tendencies cause a serious danger that railroad conditions will become similar to what they were a decade or more ago.

There is a constant whittling away of freight rates with the result that today the average rate per ton per mile is less than at any time during the war. If this tendency continues, it will of necessity, force drastic restrictions on the part of the railroads. This will mean a curtailment in purchases of large quantities of materials, supplies and equipment. Such a tendency will not help the general prosperity, but will rather tend to injure it.

As to whether a general increase in business will create a sufficient amount of freight tonnage to overcome the constant whittling away of rates that has been taking place so far as revenues are concerned, is problematical. This increase has not materialized up to the present time, and with the government going heavily into the transportation business by water, it is entirely possible that the normal growth which the railroads might othewise expect will be lessened.

Generally speaking I look for an era of prosperity throughout the country. As to whether the railroads will be permitted to participate in this prosperity yet remains to be seen. Up to the present moment there have been very few encouraging signs from the rate-making authorities. On the contrary, there are wide movements aimed at the destruction of the revenues of the railroads. Unless our business men generally can come to a full realization of the importance of railroad prosperity upon the general prosperity of the country, we are not likely to see material relief from the present adverse tendency.

Railroads are probably the largest single purchasers of materials and supplies in the country. They are the largest employers of labor. The largest part of the money they receive is immediately dispersed through the channels of trade and commerce. To force curtailments is in my opinion a short-sighted policy, and we are living in faith and hope to believe that a broader vision on the part of our business men and administrative authorities will enable them to take the longer view of things and see the great importance of enabling the railroads to go forward with the very heavy expenditures that could be made with profit to all.

Conditions in Northwest Improved

By Charles Donnelly

President, Northern Pacific Railway

ECONOMIC conditions in the Northwest in 1928, for a second consecutive year, were marked by consistent improvement. I look for further improvement in 1929.

The Northern Pacific had a good year. The grain and fruit crops were large, and prices of livestock encouraged heavy movement to market. An encouraging development in the last 12-month period was the increased demand for farm lands. And these lands were sold, not to speculators, but to capable farmers, promising a contribution to the growth and development of the territory.

The railway company, at a cost of $2,500,000, in 1928 completed, among its building projects, a new line in eastern Montana from Glendive to Brockway via Circle, a distance of 62 miles. This line opened to transportation more than 1,000,000 acres of farm lands, and settlement of that territory has progressed. In western Montana $1,000,000 was expended in relocating a line south of Missoula as a means of cooperating with a new $1,500,000 sugar beet plant, which was completed in the year at Missoula.

The late months of 1928 were marked by dry weather in the dry land wheat districts and this has had a tendency, in that area, to delay fall agricultural activities. Elsewhere normal conditions prevail.

Solution of Railway Problem Is More Education of Shippers

By F. E. Williamson

President, Chicago, Burlington & Quincy Railroad

BECAUSE of the uncertainties attending the production of agricultural tonnage, a granger line has particular difficulty in arriving at an estimate of freight traffic in advance of the crop season. We can base predictions only upon average experience in former years. Lacking December figures at this writing, it seems probable that our total volume in 1928 will be approximately 100,000 carloads above that of 1927 and not far from the average of the four years ending with 1926. The 1928 excess of tonnage, then, is merely business regained, though it happens that through unforeseen vagaries of haul and classification it has brought us higher earnings than usual.

There is no way of telling how much factors may shift from time to time. Our grain handlings during the year now closing have exceeded those in any of three preceding years, due partly to the larger crop of wheat; and partly to extra movement of corn out of Nebraska in the early months of the year to supply shortage east of the Missouri river. This unusual situation will not recur in the present feeding season for the reason that all of the corn-belt states have ample supplies of their own. Our live stock traffic also was heavier than in 1927, but lighter than in any other year since 1922. No doubt the general downward tendency in the volume of this traffic is largely chargeable to truck competition. The resumption of mining in southern Illinois has brought back a substantial part of our former coal business, which, if labor troubles do not again give advantage to other fields, is likely to continue at a normal rate.

In view of the increased buying power which the generally good crops have brought to our territory I believe we may expect at least an average year in freight traffic, if not something better; always provided that nothing unfortunate happens to the farming industry and that the stability of other conditions remains undisturbed. Certainly there is no present indication that general business will decline in 1929.

My judgment is that unless a material increase in freight traffic appears on the horizon of the new year there is no reason why the railroads should make larger capital expenditures than are necessary to maintain the status quo of service. Necessities differ in different regions and on different lines, but, by and large, this means that the amount of the 1928 investment in improvements and betterments probably need not be exceeded in 1929. I think also that improvement of roadway and structure will continue to take precedence over the purchase of new equipment, subject to superior reasons of economy in operation. It is still true that most railroads of the central west have a margin of unused capacity adequate to take on considerably augmented volume.

One significant fact about 1928 is that railroads as a whole have so cut costs of operation as to save more net money out of lower gross earnings. In the nature of things the gain from this source cannot go on indefinitely, and I share the apprehension that unless the carriers are afforded other means to offset the persistent increase of wage and tax bills the result must be a deterioration of the service which has been of such extraordinary value to shippers. Denial of increased freight rates seems to have become the policy of regulation, and the almost inevitable consequences are not to be viewed with complacence.

What measures can be adopted in the premises is the most serious problem before the carriers. My belief is that the solution, if any, lies in more complete education of the shippers. At present practically every one of them has a fixed habit of opposition to any proposed advance on his own tonnage but, discouraging as past experience has been, it may not be wholly and always impossible to convince them that the important thing about a rate is not its amount but its relationship to other rates.

It may also be practicable to reduce the question of subsidized competition to simpler terms. There is no doubt that shippers by inland waterway pay much less than the entire cost of the service for the obvious reason that the facilities are very largely supplied at public expense. In other words, all the people are taxed to provide the money for special benefits to a relatively small number. I cannot escape the thought that this situation is one in which an organized minority has prevailed over the uninformed majority.

Capital Expenditures Will Probably Not Change Much

By Carl R. Gray

President, Union Pacific System

IT IS very difficult to estimate the business of an entire calendar year in advance, because the latter half is influenced to such a large degree by the harvests which affect earnings from August to December, inclusive. For the first six months we would be fortunate to maintain this year's figures, and I rather anticipate a slightly lower gross. The loss of freight business in our territory to the motor vehicle has not been onerous, and we have no inland waterways competition. A steady growth of intercoastal business through the canal is, however, at the expense of the railroads.

As a general thing I anticipate that capital expenditures will be relatively the same as they have been for several years, with about the same proportion attributable to equipment, a somewhat greater attention to improvements designed primarily to effect economies in operation, and a considerable proportion devoted to safety in operation, such as grade separations and signals.

I must confess that I share somewhat the feeling of apprehension which has been publicly expressed about legislative tendencies and a disposition to interfere in the orderly processes of the Interstate Commerce Commission in such matters, as evidenced by the Hoch-Smith resolution and the effort that is made in each Congress to override the report and recommendation of the commission in the matter of the Pullman surcharge. Obviously the present high standard of service has its financial limitations. Ordinarily the business mind reacts properly in these matters, and our constant effort should be to present the facts and secure the assistance

or business men and organizations. The commission has and does exercise power over practically every feature of railroad operation, and has a knowledge of all the conditions which it is impossible for any legislative body to secure.

With respect to inland waterway transportation, the great menace to railway earnings is not so much their improvement to permit of navigation as it is the attempt to secure operation on these waterways by the government at a loss. If they cannot be operated successfully by private capital in competition with the railroads, then they should not be given what substantially amounts to a subsidy through the absorption of deficits by the government.

Most important of all these matters, however, is the allowance to the railroads of a living wage, and some relief from the mounting burden of taxation.

Outlook for 1929 Encouraging

By W. B. Storey,
President, Atchison, Topeka & Santa Fe

WITH the Santa Fe and with the majority of the railroads in our country, the first half of 1928 found traffic somewhat below normal, although in the northwest the situation was better. Recent months have brought about an improvement, and car loading has been larger than a year ago. The chief factors in the improvement on our lines are excellent crops of wheat and corn and a larger cotton crop than in 1927; the movement of citrus fruit and grapes has been smaller. Merchandise, coal and lumber all show moderately increased movements over a year ago, while there has been a marked decline in oil due to building of pipelines, without there being opened any new oil fields in territory served by us. The livestock industry, manufacturing and mining have been in healthy condition, and oil is rather better but still threatened with over-production.

During the year our company has extended its lines by acquisition of the Orient Company, having about 1000 miles of main line in the United States and Mexico, and of the Clinton & Oklahoma Western, having 58 miles of line in Oklahoma, which is being extended to connect with the Santa Fe at Pampa by construction of 80.6 miles of new line. Some 38.24 miles of double track have been added and about 780 miles of new rail have been laid, including 491 miles of 110 lb. rail replacing lighter weights.

The outlook for 1929 is encouraging. The territory east of the Rockies is in much better condition so far as moisture is concerned than a year ago (quite too much in Southeastern Kansas) and wheat is entering the winter in a decidedly more satisfactory condition, although the present year illustrates that it is the finish that counts. Citrus fruit promises a much larger yield, barring frost damage. We have the building of several branch lines on our program, subject to authorization by the Interstate Commerce Commission, while about the usual program of additions and improvements to equipment, roadway, and structures will be maintained in order that we may have our plant in good condition for any demand upon it.

Prospects Indicate Good General Business in 1929

By J. E. Gorman
President, Chicago, Rock Island & Pacific Railway

PROSPECTS for a good general business in 1929 are splendid. The farmer had good crops this year and fair prices; therefore has money to spend, and when the farmer is prosperous the railroads are prosperous and all kinds of business are helped. In the winter wheat sections along our lines the soil is in excellent condition, due to heavy general rains and some snow which has put the plant in fine shape, and with continued favorable weather conditions and increased acreage, there should be a bumper winter wheat crop in 1929, resulting in heavy tonnage for the railroads. There is still from 25 per cent to 30 per cent of wheat in farmers' hands or country elevators which is being held for higher prices, most of which will undoubtedly move in 1929. The live stock industry is in better shape now than it has been for years, and we anticipate a good movement of both feeders and fat cattle. The cattle producing section of our southwestern territory is carrying the largest number of young cattle known in the territory for the past ten years. There is, however, a scarcity of hogs, and prospects are for smaller shipments in 1929 than in 1928.

The situation in the oil industry is improving with the modified proration of production in West Texas. Drilling activities have been stimulated in other oil producing sections, which will increase the movement of oil well supplies, pipe, etc., over our lines as well as increase the movement of both crude and refined oil. The bituminous coal situation seems to be improving slowly, and the outlook for next year is better than for some time past. Recent settlement of wage controversies between operators and miners and replacement of the burdensome Jacksonville wage agreement by new agreements in Illinois, Indiana, Iowa and some of the other western states, should substantially improve and help to stabilize coal mining conditions in our territory.

The growth of our freight business and revenue has been substantial, but in recent years the percentage of increase has been reduced somewhat, due to highway and water competition, as well as rate reductions.

Increased Freight Tonnage 5-Year Average—	
1918-1922 over 1913-1917	13%
1923-1927 over 1918-1922	17%
Estimated 1928 over average 1923-1927	8.86%

However, the estimated tonnage for 1928, as compared with 1927 actual, shows an increase of only 1.6 per cent.

Based on our recommended budget for 1929, capital expenditures will be greater than the last few years, although we have not yet definitely decided on our new equipment program, but we have increased our expenditures for improvements of roadway and structures and major improvements in the way of new lines and reduction in grades of existing lines. The present capacity of our line is such that capital expenditures, exclusive of construction of new lines, will be devoted to making improvements, principally to effect economies in operation as well as to improve the present roadbed and tracks.

I agree largely with the view publicly expressed by

some railway executives that prevailing tendencies may cause serious danger that railroad conditions will become similar to what they were a decade or more ago. I refer particularly to such legislation as the Hoch-Smith resolution in Congress, which has not yet been given full effect, and the future growth of other means of transportation.

As to protective measures: I believe the Hoch-Smith resolution should be repealed, as it never has served a useful purpose, and never can. It is economically unsound, and if carried to its logical conclusion it would be highly destructive. Taxation, of course, is exceedingly burdensome, but heavy taxes seem to apply to everyone, and I do not know that much can be said on that score. The regulation of rates by the Interstate Commerce Commission since the period of federal control could have been more liberal, but there would be no particular fear as to the future rate structure if the Commission was left free to act without the limitations imposed upon it by such legislation as the Hoch-Smith resolution.

Another type of legislation proposed affecting the railroads is the bill in Congress to repeal the sleeping and parlor car surcharge. My own thought is that the Interstate Commerce Commission is the proper authority to pass upon that question, but as it is now pending in Congress, every effort should be made by the railway companies to prevent the passage of such a bill.

The railroads are also, of course, confronted with the problem of competition from other means of transportation, but I do not think such competition is of such moment as is the prevailing tendency to legislate rates by congress, rather than have them stated after a complete analysis of all phases of the subject by the Interstate Commerce Commission.

Continuance of Improvement Policies Considered Likely

By C. Haile
President, Missouri-Kansas-Texas Lines

GENERAL conditions in southwestern territory at the turn of the year are somewhat improved over a year ago. Increased crops of both wheat and cotton in 1928 in M-K-T territory, with improved agricultural conditions generally, warrant expectation that our traffic volume in the first half of the new year should exceed that enjoyed in the same period of 1928. Estimates of traffic volume for the year made at this season must necessarily be subject to revision as the crop season advances, because of the important influence of crops of the great agricultural staples on M-K-T traffic during the late summer and fall.

While motor competition on the highways must be expected to continue in its development, the continued growth and development of the entire southwestern territory leaves the railroads with opportunity for increased freight traffic volume, if business conditions generally are such as to encourage commercial activity.

While conditions at this time do not indicate increased railway capital expenditures, continuance of the improvement policies of the past two years seems likely. The transportation capacity of the railroads is undoubtedly equal to traffic requirements immediately in prospect, and expenditures for improvement purposes that will increase efficiency of operation offer the best prospects of productive results. The recent trend toward relatively larger capital expenditures for improvement of roadway and structures, than for new equipment, is therefore likely to continue.

Growth of Railway Traffic Affected by New Influences

By L. A. Downs
President, Illinois Central System

IT is true that the increase of freight traffic in recent years has been proportionately less than the increase in the commercial activity of our larger population. The explanation may lie partly in the greater use that is made of our highways and inland waterways for the transportation of freight. However, all the traffic carried on our inland waterways is not yet large enough to account for more than a small part of the ungained railway traffic; and in respect to the highways, there is some ground for the belief that their greater use has created enough additional railway freight traffic to offset the losses which thus far have been sustained by the railroads in that direction. If these conclusions are justified, we must look elsewhere for the explanation, and I offer these suggestions:

Production of coal has not kept pace with the growth of population and wealth. To the extent that this has been due to the use of oil, gas and electricity, railway traffic has suffered, because while coal is the largest single item of railway freight traffic, these substitutes are transported more and more largely by pipe lines and transmission wires.

Then there is the migration of industry that is constantly going on. Industries change locations for several reasons, one of which is to get nearer sources of raw material or centers of consumption, or both, in order to save transportation expense. There is also the tendency of industries to break up into smaller units for similar reasons. These changes probably account in some part for the railway freight traffic situation.

Moreover, with our increasing per capita wealth there is a greater demand for articles that were formerly considered luxuries which do not require as much transportation relatively in their production as most of the older necessities do. It is likely that this tendency also holds some part of the explanation of the traffic situation

The speculation might be extended to some length. There are some developments whose influence upon railway freight traffic is even more difficult to trace—chain stores and hand-to-mouth buying, for example. These considerations are sufficient, however, to indicate that the comparatively small increase of railway freight traffic is probably due only in part to the traffic gains of highway and inland waterway carriers.

These same considerations must also modify any estimate of the future trend of railway freight traffic. This much, however, seems reasonably certain; the growth

of railway freight traffic in the future, even if the relative growth of transportation on inland waterways and highways is checked as a result of public insistence upon more equitable terms of competition with the railroads, will be at a lower rate than in the past.

It is accepted as fundamental that the prospect of increased traffic calls for expenditures upon the enlargement and extension of railway facilities. There is also the need—and it increases as time goes on—for capital expenditures upon the modernization of railway property both for the improvement of service and for the reduction of expense of operation. Regardless of what view may be taken as to the future trend of railway traffic, therefore, the railroads will continue to require capital expenditures over and above replacement needs, and the extent to which such expenditures can be made will continue to be determined by the prospect of earning power.

Much of the economy that has been effected in railway operation in recent years has been due, as everyone knows, to the greater utilization of railway equipment. One result of this development has been that equipment retirements have exceeded installations. While I do not believe that all the opportunities for such improvements have been exhausted, I am inclined to believe that the great progress made in recent years has created a situation where the railroads are likely to need more equipment in proportion to other capital expenditures than in the last several years.

The immediate future of railway capital expenditures, however, is complicated by several important uncertainties. One is the uncertainty over the final outcome of the valuation question. Whether the view is justified or not, there seems to be widespread feeling that the establishment of a relatively low basis of valuation may render it even more difficult than it is now for the railroads to realize earnings sufficient to attract new capital for the enlargement and improvement of their properties. Another uncertainty is the seeming difficulty of effecting a revision of the consolidation law which will facilitate a practical solution of the problems involved. Perhaps the greatest limiting factor upon capital expenditures in the immediate future is the uncertainty over the rate situation. There are continued demands for rate reductions despite the indisputable fact that the rate level is already plainly inadequate. The effort to resort to congressional rate-making in order to do away with the Pullman surcharge and the constant threat which hangs over the rate structure in the form of the Hoch-Smith resolution are two evidences that this uncertainty is more real than fanciful.

I share the view that present tendencies in the railway situation are indicative of a grave danger that history may repeat itself by once more rendering the railroads incapable of providing the character of service which has proved so beneficial to the public in recent years. The problems listed by the *Railway Age* are not easy of solution, but these measures are suggested as at least partial solutions:

(a) Competition—There should be a more vigorous effort to sell railway service on the basis of its distinctive merits, and public opinion should be encouraged to demand a better equalization of the terms of competition.

(b) Wages—Railway employees should receive the most liberal wages that economic conditions justify. This is fundamental to good railway service and to the high purchasing power of our population, which is one of the foundations upon which our national prosperity rests. On the other hand, however, wages must not be allowed to run away from the volume of traffic and rates, which produce railway revenues.

(c) Taxation—There should be an insistence upon the same principles of efficiency and economy in government which are fundamental to all other kinds of business, and public education should continue to the end that everyone will understand that railway taxes can only be paid out of revenues received from shippers and passengers.

(d) Rates—There should be a more vigorous and better co-ordinated effort by and among the individual railroads for the protection of their rate levels, and no effort should be spared to convince business men themselves that rates high enough to insure continued good railway service are more profitable to them than reductions which impair railway earning power.

Tendencies in Regulation Cause of Great Concern

By Whitefoord R. Cole

President, Louisville & Nashville Railroad

WHILE the operations of the Louisville & Nashville for 1928 were reasonably satisfactory taken as a whole, yet there was a substantial decrease in the volume of traffic handled as compared with the past two years. This was due partly to the disturbed conditions in the coal industry and partly to a decline in business, which latter seems to be more or less the inevitable concomitant of a national election. Our experience is largely typical of the railroads of the country, particularly those handling a great proportion of coal traffic, and it was only through the application of most rigid economies and the closest possible attention to greater efficiency that the showing for 1928 was accomplished. However, there are already signs of improvement in the resumption of commerce, and with the political situation settled and industrial conditions generally on a sound basis, I confidently look for the coming year to show marked improvement.

It will be necessary in the future, as in the past, to make improvements to railway property, not only to take care of the additional business of the growing country, but also to handle the present and prospective traffic in a more efficient and economical manner; consequently, if the railroads can continue to command the necessary credit or obtain the necessary funds by being permitted to earn a more nearly adequate return on their investments, I believe substantially the same amount of capital will be invested, at least in the immediate future, as in the past, and doubtless in about the same proportion as between roadway property and equipment. I might add that the L. & N. is contemplating, in 1929, pretty much the same character and volume of improvement work that it has prosecuted during the recent past.

I heartily agree with the view that the existing tendencies in railroad regulation and taxation contain possibilities of great concern to the railroads— and I can quite properly state, to the public as well. The inroads

being made by competing forms of transportation which are not subjected to the same kind of regulation the railroads are, and are not required to share proportionately in the public burden; the constant rise in the level of wages; the increasing assessments for taxes—which in 1928 were higher relatively than ever before; the gradual tendency downward of rates—which measured by the ton-mile rate have declined over fifteen per cent since 1921—either through the constant whittling away of the rate structure or the assumption by Congress of rate making powers—these are some of the subjects which might be included in the category and which deserve serious consideration.

In my opinion, the most effective means of preventing encroachments of these kinds to the extent of impairing the railroads and rendering them unable to give the public that character of service which it demands, is through vigorous opposition to the policies of both state and national governments, when they tend to exceed the bounds of reasonable control of the railroad activities, through appeals to the law making bodies and through the medium of publicity that will result in proper public enlightenment and the establishment of a sound public policy concerning railroad transportation problems.

Railroad transportation is absolutely vital to the country's continued progress. The railroads are now in a higher state of efficiency than ever before because of the vast expenditures recently made on the railway plant, and the public has been the greatest beneficiary. Public policy now virtually requires that railroads raise large sums annually to keep their plant efficient; that same public policy ought decisively to turn thumbs down on any sort of movement calculated further to restrict them in their successful effort to give sufficient and satisfactory service.

Conditions in Pocahontas Region Are Very Unusual

By A. C. Needles

President, Norfolk & Western Railway

BEFORE answering the questions in your letter of November 26 in detail, I want to call your attention to the fact that the Norfolk & Western Railway is unlike other railroads in many respects and that therefore our replies should be carefully analyzed before being added to any symposium intended to express the views of railway executives regarding railway conditions and prospects." The character of our traffic, our geographic situation, the territory we serve, all differentiate this railroad from others except those in the Pocahontas region. This difference, colors our replies to some extent and limits their usefulness in determining "railway prospects."

Conditions in the territory served by the Norfolk & Western indicate that our freight business in 1929 will be about the same as in 1928. Coal constitutes more than 70 per cent of our tonnage and it seems improbable, in view of the revival of coal mining in other districts and the lack of any prospects for an increase in export coal shipments, that coal loaded on the Norfolk & Western in 1929 will exceed the loadings of the previous two years. We do expect that the volume of coal loaded in 1929 will approximate the volume loaded in 1928 and that our merchandise and miscellaneous traffic will either equal last year's tonnage or possibly show slight improvement.

The growth of Norfolk & Western freight business has not been "comparatively small within recent years." The average annual increase in freight revenue carried in the five-year period, 1911-1916, was 3,709,038 tons; the average annual increase in the five-year period, 1921-1926 was 5,700,628 tons. Our freight business in 1927 was 5.74 percent less than in 1926 but this decline is the first recorded since 1921 and furthermore is not due to competition from other forms of transportation. In fact, with coal and coke (which cannot be moved long distances efficiently or economically by motor truck) constituting more than 75 percent of our tonnage and with no parallel navigable waterways from sources of supply to markets, it is not probable that either highway of waterway competition will be as large a factor in determining the volume of our traffic as it undoubtedly is in the case of other railroads.

The capital expenditures of the Norfolk & Western in 1929 will probably total about $16,000,000. for roadway and structures and $7,000,000. for equipment, a combined capital expenditure of approximately $23,000,000. This estimated amount is slightly larger than the annual capital expenditures of the last three years and slightly less than the capital expenditures of 1924 and 1925. The larger amount proposed for 1929 is due primarily to three projects: the construction of a 39-mile branch line into Buchanan County, Va., and a connecting line about 11 miles in length into the Guyandot Valley in West Virginia, and grade crossing elimination work at Columbus, Ohio.

In the period from 1923 to 1928 inclusive, the average yearly capital expenditure of the Norfolk & Western for roadway and structures was approximately $10,900,000. and for equipment approximately six and one-half million. Comparing the proposed capital expenditures for 1929 with these averages you will note that both items are slightly above the average, with the largest difference in the amount for roadway and structures (due to new construction mentioned above). In general I think that our capital expenditures for equipment in future years will remain at about the same average level whereas our expenditures for roadway and structures will probably average slightly less than they have in previous years.

Improvements made to effect economies in operation usually improve the efficiency of operation and result in increasing the capacity of the transportation plant. If, therefore, the volume of traffic grows at a comparatively moderate rate, it is obvious, in view of the proven ability of the railroads to handle the nations present traffic efficiently, that "capital expenditure will be devoted in relatively larger measure to making improvements primarily to effect economies in operation." If the volume of traffic increases rapidly a comparatively larger portion of capital expenditure will undoubtedly go toward increasing the capacity of the carriers.

While many prevailing tendencies are not favorable to the railroad industry, I do not think there is "serious danger that railroad conditions will become similar to what they were a decade or more ago." The present unprecedentedly good service may not continue indefinitely, if some prevailing tendencies are not curbed, but I feel sure that the foresight and sound judgment of the business men of the nation will operate to prevent

any return to the days of car shortage, congestion, delay and general transportation inadequacy.

The question of "revenues and service" are closely interwoven and interdependent, one upon the other. The railroads have demonstrated their desire and ability to render efficient service and I think will endorse a revenue principle that will insure continuation of this new era of transportation efficiency.

Prospects in South Better

By George B. Elliott

President, Atlantic Coast Line Railroad

CONDITIONS in our territory indicate a more favorable freight business in 1929 than in 1928. The comparatively small growth of freight business over our line in recent years has been due to its diversion, to some extent, to motor transportation.

I do not believe that capital expenditures in 1929 will be as large as in recent years. I believe that the present capacity of the railways is such that capital expenditures will be devoted in a relatively larger measure to making improvements primarily to effect economies in operation rather than for increase of capacity.

Unless the constant downward trend of rates is checked, it is obvious that the railroads will become unable to continue to render their present unprecedentedly good service. Of course there are other elements that enter into this, such as mentioned by you—i.e., competition of other means of transportation, increased wages, taxes, etc.

Expenditures for Improvements Will Continue as Heretofore

By P. E. Crowley

President, New York Central Lines

IN considering, from a railroad point of view, the outlook for the business for the year 1929, and reviewing the occurrences of the past year, the indications would seem to point to a continuance of good business, if not to an increase in volume.

The purchasing power of the country at large is becoming greater; standards of living are higher, and the liberal education, which travel affords, is becoming more and more appreciated by the people of the country.

The freight traffic of the railroads has been conducted in speedy and reliable fashion and this will continue. Vast expenditures have been made to put the railroads in proper condition for doing their work economically and with expedition, and to keep them so.

As an example, during the past year the New York Central Lines have spent, in additions and betterments, exclusive of equipment, upwards of sixty millions of dollars, and they will spend at least that amount during the coming year for the same character of work. Other roads are spending in the same ratio and will, no doubt, continue to do so, so far as they are financially able.

The ability to continue making large expenditures for improvements and to keep up the present high standard of service depends, of course, upon adequate revenues, and they, in turn, depend upon the maintenance of the proper rate structure. Should rates be reduced, both the gross and net revenues of the railroads would fall, necessitating retrenchment in various directions with a consequent curtailment of service. But I am hopeful that the present standards will be maintained and, therefore, look forward to the coming year with confidence.

Tendency Toward Pre-War Conditions Is Menace

By George Hannauer

President, Boston & Maine Railroad

WE are hopeful that we will have a larger freight business in 1929 than in 1928. We believe that high-way competition has had a material influence on railway travel and freight traffic. In New England, however, and particularly on the Boston & Maine, local water competition has not been such a serious problem.

We expect our capital expenditures in 1929 to equal or exceed those in recent years. Our capital expenditures for equipment will be a comparatively small part of the total. Very few expenditures will be made for adding to capacity; most of the expenditures will be made to produce greater operating economies and to improve quality of service.

In my opinion, there is a tendency toward the conditions that existed prior to 1918 and I feel it constitutes a menace that should be met by proper publicity, by open dealing with the public, and by enlisting the active cooperation of shippers and bankers, both of whom have an important interest in the matter.

In addition, the carriers should urge that the public study the economic soundness of competitive means and take into account the fact that traffic lost to railroads usually means less railroad service and higher railroad transportation costs.

The railroads should stand firm in keeping the wages in line with the general trend of wages in the country, and the public should be urged to support such a position.

We should urge liberal treatment for the railroads on taxation on the ground that they are public service corporations, that service and earnings are limited by public regulation, and that burdens removed from railroads accrue to the public in better service and lower transportation costs.

As a general policy, carriers should recognize that existing industry was built up on the present rate structure, and in turn existing communities were built around the industry, and that carriers should make every effort they consistently can to maintain such rate

adjustments as are necessary and justified for the continuance and expansion of such industry.

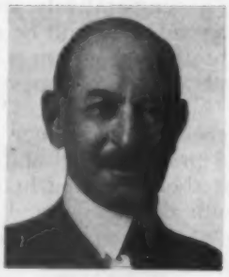
Furthermore, regulatory bodies, as a general policy, ought to oppose general rate reductions sought by shippers and should order reductions only where there is evidence of unfair dealing with the shipper by the railroad. I also am of the opinion that whenever the earnings of the railroad should warrant rate reductions, such reductions should be made only as a result of an expert study of the whole structure, and that reductions be given where they are most merited as against the present policy of giving them to the individuals who are the most aggressive.

Railroads in making voluntary reductions should proceed with great caution, taking no action until the subject has been thoroughly studied and the possible effect on other rates fully considered.

I think the policy of open dealing with the public in rate matters should be continued and extended wherever possible and that every effort be made to have the industrial executives acquainted with the situation to the end that they will not press their traffic representatives unduly in the matter of securing rate reductions. We should encourage industries to create their own traffic departments and discourage the employment of the so-called "ambulance chaser" who has no interest in the ultimate effect of rate reductions upon the railroads and upon the industry itself, his only object being to obtain a profit for himself out of the particular case he has in hand.

Capital Expenditures More Largely to Effect Economies

By J. E. Taussig
President, Wabash Railway



I HAVE every reason to believe that the freight business for 1929 will be as great in volume as in 1928 in our territory, although it is quite apparent that the increased tonnage handled on public highways and on waterways accounts for the small growth of comparatively the freight business in recent years.

Capital expenditures will no doubt be relatively as large in the year 1929 as they have been in recent years. It appears, however, that the tendency, at least for a number of years, will be for the railways to devote a relatively large proportion of capital expenditures to the making of improvements primarily to effect economies in operation rather than to increase the capacity of motive power or freight equipment.

There is no question but what transportation conditions of the future will present a serious problem and the roads will be unable to maintain the service demanded unless there are some protective measures adopted as respects:

(a) The use of highways by motor buses and trucks for the transportation of freight and passengers, which should be subjected to the same regulation as is transportation by rail.

(b) If the wages and working conditions of railway employes are to be determined as in the past few years, then it would seem that in such determination there should be more serious consideration given to the ability of the transportation lines to earn a sufficient amount under the rates that are made and provided by rate-regulating bodies.

(c) There has been an enormous increase in the taxes paid by railroad companies in the last ten years. This is the result of the increased cost of operating governmental and municipal affairs and the construction of highways. There should be an active effort made to reduce the cost of conducting governmental and municipal affairs, and the taxes for municipal highways should be apportioned so that the users of the highways will bear a greater proportion of the tax.

(d) Adjustment and regulation of rates should be carefully considered by the regulating bodies and, in so doing, they should give consideration to the increased costs of operation by reason of wage and tax increases.

Continued Railway Progress Involves Many Problems

By Edward G. Buckland
Vice-President, New York, New Haven & Hartford Railroad

FROM such indications as are available at the present time, freight traffic on the New Haven System during 1929 should be substantially the same as in 1928. Competition by highway and water has undoubtedly had an effect upon freight business the growth of during recent years. Another factor of some weight is the steady expansion of the use of electric power in industry, which has substantially reduced the consumption of fuel. The increasing use of fuel oil in homes and industrial plants, which moves to a considerable extent via water, has also reduced the volume of coal previously handled by rail.

Capital expenditures by the New Haven during 1929 should not be materially less than in recent years. The steady improvement in efficiency of operation during recent years has so materially increased railroad transportation capacity that it seems ample for the immediate future at least, to adequately handle the prospective volume of traffic, particularly considering the tendency towards restriction of growth previously mentioned. Under these conditions increased capacity should not be immediately necessary and improvement work will be largely devoted to effecting such further economies as may be possible. There is also to be considered the large amount of unremunerative work required under public orders, such as elimination of grade crossings, safety measures, etc.

A bright spot is the decision of the Interstate Commerce Commission in the train control case, that the railroad managements are making better progress in increasing safety than would be accomplished through an order of the commission for further expenditures for train control.

The grade crossing situation is not so encouraging. Although railroads have spent hundreds of millions for grade crossing elimination, demands for further ex-

penditures for this purpose, for rebuilding bridges built in previous grade crossing eliminations, and for extending new streets across railroads are practically unlimited. Present laws requiring large contributions by railroads, whereas the public is the cause and principal beneficiary, should be amended. Educational campaigns should be waged to point out the inequity of compelling railroads to expend large sums for these purposes.

In Connecticut, Massachusetts and Rhode Island in 1927, 1,172 people were killed in automobile accidents, only 33 of which were at railroad grade crossings. Of 49,638 injured in automobile accidents in those states only 106 were injured at railroad grade crossings. Had all grade crossings been eliminated at appalling expense there would have been at least 1,139 killed and 49,532 injured. The press features the 3 percent killed and ¼ of 1 percent injured in automobile grade crossing accidents. The 97 percent killed and 99¾ percent injured in other automobile accidents are contemplated with complacent indifference. Public regulation of automobile driving that will reduce the terrible slaughter on the highways will be more effective in saving lives and preventing accidents than the elimination of all grade crossings at stupendous expense.

Adequate public control of automobiles and driving comparable with the control of railroad equipment and operating personnel would so decrease automobile fatalities that there would be no grade crossing problems. If the public will not properly control the driving of automobiles, the railroads should be relieved of all participation except in proportion to benefits actually derived at any particular grade crossing elimination.

I am in accord with the views recently expressed by railroad executives with respect to the seriousness of the present railroad situation.

The railroads have made remarkable progress in recent years in improving their service and reducing costs. Apparently there is a general feeling that they can continue indefinitely to reduce their costs of operation in the same degree. This is not the fact, as the railroads have unquestionably closely approached the limit of further economies, particularly in view of the shrinkage in growth of both freight and passenger traffic already alluded to. While there seems to be common acceptance by industry in general of the principle that the railroads are entitled to a fair rate of return upon their investment, individual applications for adjustments in rates for one reason or another are so numerous that the rate structure is being constantly worn down with consequent shrinkage of revenues. Such a condition cannot longer prevail without serious danger that the railroads will not only be unable to continue to make such further improvements in service as are possible, but will not be in a position to maintain the highly satisfactory service now being rendered. A return to the inadequate and unsatisfactory service of a comparatively few years ago would cost the public far more than would be gained by lower rates which are being sought in such large measure. Adequate, dependable service is of more importance to industry than slight reductions in rates, the cumulative effect of which seriously impairs the railroad's ability to render the desired service.

The action of the Interstate Commerce Commission in prescribing simplified rate scales offers at least a partial remedy for this situation. These new rate schedules will include sufficient classes so that practically all special or commodity rates can be eliminated, thus diminishing the opportunity and necessity for a large number of the individual applications to the commission for rate adjustments, and will at the same time relieve the commission and the railroads of a considerable burden of work now necessary in reaching conclusions on these rate matters. The railroads and industries should cooperate with the commission to the fullest possible extent in bringing about these simplified rate schedules.

So far as competition of other means of transportation is concerned, the railroads should be, and I believe are, alive to the necessity of developing their service to meet the changing demands of the public.

For example, the comprehensive motor coach systems for passenger travel on the highways established by many railroads, providing a high character of service closely coordinated with rail transportation, are securing for the railroads a share of the travel formerly using their trains, and enabling considerable economies in passenger transportation costs.

The competition of the motor truck handling freight over the highways, mostly for short hauls, presents a more serious problem. The railroads have done what they can to hold this business by establishing straight-to-destination cars wherever possible, offering overnight deliveries. They have, however, been slow to enter the motor truck field themselves because of the doubt of being adequately compensated out of the rates they could establish for joint rail and truck service. If adequate compensation for such service can be assured, the railroads could undoubtedly develop a more dependable and reliable character of service than much of that now

(Continued on page 62)

Traffic Prospects Are Good

By J. J. Bernet

President, Erie Railroad

IN my opinion, the outlook for freight business in our territory for the year 1929 is promising. We anticipate that we will do as well, if not better, in 1928. The highway motor trucks for shorthaul freight revenue traffic and the waterways have in a substantial measure affected railroad freight traffic.

Assuming a satisfactory volume of business in the early part of 1929, the capital expenditures, in my opinion, will be as large as during recent years and possibly larger than in 1928. The expenditures for improvement of roadway and structures, so far as our line is concerned, will probably increase in about the same proportions as those made for new equipment. The capital expenditures of all roads will, in my opinion, be devoted in a relatively large measure to making improvements to effect economies in operation rather than for increase in capacity, except that a number of the terminals in the larger cities will have to be gradually increased to satisfactorily, as well as economically, handle the business.

It is very necessary, if the railroads are to continue to give the service which has been given during the last few years and directly benefit the country by enabling the carrying on of business with a minimum amount of money tied up in inventories, that wages shall be kept within reasonable range, the upward trend of taxation be checked and rate adjustments and regulations be determined so as to yield greater net revenue during times of good business, such as enjoyed during 1928, if the credit of the roads is to be sustained during times of light business.

Railway Supply Prospects in 1929

The railways must study to be prepared for industrial and trade expansion

By Alba B. Johnson

President, Railway Business Association

IN his address at the recent Railway Business Association dinner, President Willard of the Baltimore & Ohio stimulated railway supply manufacturers with a picture of the standard which he would like to see developed by American railways—a high standard as contrasted with what he termed a merely "adequate" or "minimum standard." He declared his wish that all our railways could command the capital with which to create such a high-grade system; remarking that "until such a policy as I have endeavored to sketch can be made effective you will never know the possibilities of the railroads, not only as transportation agencies, but as stabilizers of business and employment as well."

Purposes of Improvements

The improvements which Mr. Willard cited may be classified under two headings as to the purposes which they are intended to promote: Preparedness to serve and the comfort and convenience of the public. I invite at this time particular attention to the first—preparedness to serve. On this point Mr. Willard, having conceded that among the factors likely to influence the future volume of railway traffic are a number tending to retard its growth, stated that of the total tonnage, other than that on the Great Lakes, 90 per cent goes by rail, and said: "It is evident, therefore, that the railroads are, and probably for a long time will continue to be, the most important transportation agency in this country. While we would hardly be justified, for the reasons I have mentioned among others, in expecting the traffic carried by the railroads to increase as rapidly in the future as it has in the past, *it would certainly be most unwise to assume that the business of the railroads had now reached the maximum and that no additional facilities will be necessary. To follow such a course would be simply to invite a recurrence of conditions preceding the war.*" (Italics mine).

In short, if the Baltimore & Ohio were financially equal to it, maintenance and additions would now be under way on a larger scale than at present, not only for the public convenience, but for preparedness to handle an increased traffic not now clearly foreseen; and Mr. Willard evidently intends to give the impression that he believes the same to be true of most if not all the roads. "I wish," he goes on, "we felt in position on the Baltimore & Ohio to add to our freight equipment 5,000 or 10,000 additional cars of modern construction at this time." He enumerates as illustrative some other kinds of goods which he would like to be buying in much larger quantities than now. "It is true," he observes, "we have had a surplus of freight cars on the Baltimore & Ohio for some five or six years, and we see no urgent need for buying additional equipment at this time. Nevertheless if we did buy we would be doing something that might be of great importance to the public later on in case there should suddenly come about a sharp and unexpected increase in the volume of business offered to the railroads."

Importance to the railway supply industry is the volume of product required by the railways for the promotion of safety and of the public comfort and convenience; but a preponderant part of the total arises from maintenance and additions carried on in preparation for adequacy of service; and the traffic expectations of those who frame railway capital and betterment programs determine whether the railway supply industry at a given moment languishes in the doldrums or approaches full use of manufacturing plant and of employees' services.

Railway Situation Analyzed

It would therefore seem timely in this annual review of conditions in our industry to analyze briefly to date the hauling capacity of the railway plant, the margin of capacity over actual use at the 1928 peak, the traffic increase which would exhaust the margin, and finally the traffic and income prospects.

Before doing this it may be noted that at the end of November the Interstate Commerce Commission handed down a report declining to order further installation of automatic train control appliances, and leaving the railways free to exercise their own discretion. For many months the investigation of this subject had involved a serious suspension in the installation of signal systems already standard or under experiment on a large mileage. Manufacturers in that field are now free to urge their wares upon the railways in a commercial atmosphere, the railways proceeding in accord with their judgement to develop signal and control systems aimed at safety, efficiency and economy. Whatever anyone may think of the decision, business is resumed.

Measuring Strain on Facilities

At the end of October, 1927, I published a statement, "Railway Capital Programs," in which capacity of equipment was analyzed. For application now, the method is modified by an improvement since suggested and accepted. The purpose is to measure the strain upon facilities. Previously the car-loading peak was identified as a single week. To this it is objected that what wears the plant down and tests its efficiency is a series of heavy weeks. Four successive weeks are studied as better representing the actual summit of demand, achievement and exhaustion of surplus. In 1928 the four successive weeks for which the largest aggregate car-loadings were reported were within October. Amount of equipment owned is tabulated monthly and its condition twice a month.

The Equipment Situation

In October Class I railroads owned freight locomotives rated at a total tractive power of 1,807,542,684 pounds. This was an average of 49,328 pounds per lo-

comotive. The date upon which freight locomotives stored and in good order fell to the lowest point was November 1, when the number was 2,682. Figures as to the average rating of good-order locomotives in white lead are not available. Authorities differ as to whether they equal the average rating of all locomotives owned. Assuming that they do, tractive power of stored good-order locomotives was 132,404,976 pounds. Of total power in pounds October 15, 15 per cent was out of order.

Some claim that in weeks of very heavy rise in traffic bad-order power increases. On the other hand it is pointed out that a boom is likely to cast shadows before it spurring the roads to reduce bad-order equipment in advance of the actual jam. Suppose that under pressure the bad-order percentage could and would have been reduced to 13 per cent (a point never yet touched). This would have added to the good-order locomotives stored 2,648,100 pounds, giving as the total tractive pounds available but not in use at the date of greatest depletion 135,053,076. Mr. Willard refers to the possibility of "a sharp and unexpected increase in the volume of business offered to the railroads." The stock in power was 7.5 per cent of total owned. To exhaust that surplus would require an increase of 7.5 per cent in traffic.

In October, Class I roads owned 2,294,182 freight cars registered at 105,106,028 tons. This was an average of 45.81 tons per car. The date upon which good-order cars not in use reached a low point was October 14, when the number was 85,825, or an aggregate of 3,931,643 tons. Of total cars owned in October, 6.6 per cent were out of order October 15. Assume that anticipating or meeting a car-famine the bad-order percentage could and would have been forced down to 5 per cent (never yet attained). This would have added to the good-order cars awaiting requisition 1,681,696 tons, giving as the total car capacity available, but not in use at the date of smallest surplus, 5,613,339. This stands in 1928 as the margin of car safety. Of the car capacity in use this was 5.3 per cent—the increase per cent in car-loadings which would have wiped out the car surplus.

To judge what the traffic increase might presently be if general activity much broadened, it may be noted that from the 1925 peak, which scored what was then a new car-loading record for four weeks, the increase in one year, at the 1926 four-week apex, was 7.7 percent.

Thus if the increase in the top four weeks' loadings 1926 over 1925, or 7.7 per cent, were to recur 1929 over 1928, and available power and car supply at the 1929 peak merely equalled that at the 1928 peak, the power slack, 7.5 per cent, would be turned into a shortage of 0.2 per cent, and the car slack, 5.3 per cent, into a shortage of 2.4 per cent.

As I write, figures have just come showing that the ton-miles, as distinct from car-loadings, in October, 1928, came within two-tenths of one percent of the all-time record of 1926.

A year ago it developed that for the first time power showed a decrease both in number of locomotives and in total tractive pounds, while freight cars had increased in aggregate tonnage capacity. In the year ended with October, 1928, both locomotive tractive pounds and car tonnage capacity declined:

	Freight Locomotives	Pounds
Tractive power owned,	Oct. 15, 1927....	1,823,354,803
" " "	Oct. 15, 1928....	1,807,542,684
Reduction in 12 months.....		15,812,119, or 0.9%
	Freight Cars	Pounds
Total capacity owned,	Oct. 15, 1927....	212,001,113,000
" " "	Oct. 15, 1928....	210,212,056,000
Decrease in 12 months.....		1,789,057,000, or 5.1%

In the statement a year ago which I am here bringing up to date it was observed: "Traffic increase may be likened to a flight of steps. Each step is one per cent." If there were no further reduction on October 15, 1929, in the locomotive power owned in October, 1928, the locomotive supply would be exhausted before car-loadings passed the eighth step. Maintaining in October, 1929, the available freight-cars as of October, 1928, the car-supply would be exhausted before car-loadings reached the sixth step. These percentages are to be compared with the actual rise in car-loadings for the banner four weeks 1926 over 1925, which was 7.7 per cent.

It is always essential to remember that the performance of cars depends upon very many other factors than their aggregate tonnage capacity. There is a limit to the increase in actual average loads. This is the one goal set by the roads in their 1923 program from which performance has in fact receded. It may require as many cars of larger size to haul a given quantity of freight as of smaller cars. Car performance, again, waits on locomotive performance. Achievement by power, finally, is the complex result of innumerable efficiencies of plant and management. Every department of the railroad, backed by every branch of the supply industry, contributes to the grand result. When we say "car surplus" we really mean "facility surplus."

Traffic Prospects

This brings us to traffic prospects. Though we share the perplexity of those who emphasize highway and waterway competition and other factors not susceptible even of approximate measurement as obstructing forecasts, it would seem as if there were still a scope within which to form business judgements, especially as to short periods ahead. A sharp slump in railway freight traffic occurred in the spring of 1927, from which recovery has not yet availed to surmount the previous peak—that of 1926. It is exact to say that comparing the high point in 1926 with the high point in 1928 there is no increase in traffic, either car-loadings or ton-miles. On the other hand, several factors distinguish our immediately current era from the past, when traffic volume grew. Will anyone maintain that all of a sudden in May, 1927, the new factors became operative, and then and there once and for all put an end to national progress, or at any rate to expansion in railway freight? To state the idea is to abandon it. We are now and shall be in 1929 in a period practically identical with the years 1923-1926 in respect to the general elements affecting advance in the nation's business and in the railways' share of the freight. This was the trend then and so long as general conditions persist as they are, may be expected to be the trend again whenever particular circumstances are similar.

In the spring of 1927, not quite four years from the great 1923 climax and slump, we were in a position where the construction and enlargement of industrial and commercial plant, instead of leading other construction, was trailing residential, federal, state, county and city construction. If you asked why, you were told that production capacity of plant was then excessive and that rates for money were too high to tempt capital into commercial and industrial plant expansion. You inquired why money rates were so high, and learned that the reason was the absorption of capital in stock speculation. That spring two incidents occurred which have been held to have interrupted the course of national growth as it was then proceeding on the moderate scale characteristic of eras when plant construction is laggard.

In March, 1927, threat of a coal strike led consumers to lay in fuel stocks, carrying railway car-loadings to

a March point seasonally unique. The strike did not occur, and total railway traffic was less by a large amount of coal for the rest of the year, diminishing the car loadings otherwise necessary in the fall peak which tests facilities. In the four October weeks of largest car-loadings 1927 showed coal 15 per cent of the total as against 17 per cent in the four weeks ended on the same date in 1926; while our four October weeks accounted in 1927 for 8.4 per cent of total coal loadings during the year as contrasted with 9.0 per cent a year earlier. The coal incident of 1927, the importance of which has been exaggerated, is a circumstance which may occur again but probably not soon. No signal success has attended effort to distribute coal movement through the year for relief of the roads and of the shippers at the annual traffic peak.

Automobile Production Shut-down

The second circumstance was the Ford shut-down, spreading contagion throughout the automotive industry and depressing a wide area of industry and trade. In the era under review, when commercial and industrial plant construction is marking time, a similar hesitation in railway purchases—one of the greatest factors in determining whether national growth in given years shall be relatively fast or slow—was considerably offset by the development of motor car manufacture and distribution. Direct and indirect consumption of materials in that industry is reported to have involved in 1926 the shipment by rail of 3,280,000 car-loads, or 9.3 per cent of total car-loads. Out of this business grows consumption of miscellaneous necessaries and luxuries by the 3,743,781 persons reported to have been employed directly or indirectly in 1926. That is the size of the group whose activity was slowed down in the spring of 1927, not by economic law, not under conditions likely to recur.

From 1923 to 1926, inclusive, production of passenger cars and trucks in the five months ended May 31 averaged 40 per cent of each year's total. In 1927 the first five months' production was 51 per cent. With output what it was January-May, inclusive, if the pace had held up throughout 1927 so that the first five months' production, as on the previous years' average, had been 40 per cent of the year's total, then the additional vehicles built would have been 973,154, and the 1927 total would have represented an increase of 68,640 over 1926, instead of 904,514 below 1926.

It may be asked: In October, 1928, with A models up to 6000 a day and rising, while Mr. Ford's competitors were going full tilt, why did not railroad car-loadings surpass 1926 and exhaust railway facility surplus? Do not automotive artisans, dealers, salesmen and so on on—these more than 3¾ millions; do they not resume originating traffic for the railroads when they go back to work? I answer: Do you, gentle reader? Or do you go through a period of economy while you pay the debts incurred during months of idleness? Within 1.1 per cent, moreover, the 1928 peak equalled that of 1926. We can but conjecture what volume the traffic would have reached in 1928 if it had not been for the automobile shut-down of 1927.

Like the dislocation of coal orders, the interruption of automobile production may recur but probably never on such a scale in any period not for other reasons conducive to recession. Apparently as this is written automotive production is well along toward re-occupancy of the position which it filled in 1926 and January-May 1927, as a factor in national growth and in railway freight.

Until industrial and commercial plant resumes leadership in the construction field would it not appear reasonable to expect that railway traffic will increase at about the pace, already set forth, shown in 1926 and January 1927—the pace characteristic of that stage in a long recovery before manufacturing and commercial plant (not to mention railway plant) has entered upon vigorous expansion?

When will trade and industry again give the United States the aspect of a new and growing country? When will existing mills, warehouses and retail establishments contract for those additions and overhaulings which at once prepare for a boom and bring one on? When will the inventor, now cooling his heels, find capital ready to be persuaded that it is time to launch his device? It is the view of many that development has awaited a check in stock speculation.

A short time ago I was permitted to learn the contents of a report compiled from information collected by a concern covering the whole country. The news was gathered by hundreds of agents interviewing individual business men and building contractors. The summary was that in every part of the country trade and industrial building projects, together comprising an immense total, are held back waiting for a lower rate on money. In the stock market of the last two years, the extraordinary features are the size of the transactions, the number and amateur character of traders and the distance in many instances that prices have climbed beyond values as measured by dividend rates or earnings. Not so unusual is the protraction of this market. An economist has recently studied bull markets and found an average duration of 20 to 26 months. That time is near.

When this article was written, December 11, stocks had been falling violently for several days. The advance since election had been lost. In view of the inexperience of a large part of those who have been speculating and the traditional addiction of amateurs, and indeed all laymen, to the bull side, I would expect that before these observations appear in print it will have become evident that the concentration of funds in stocks has been abandoned by a great multitude of persons. Technical comment inclines to the hope that the decisive turn, however painful to many individuals who are, as the phrase goes, caught holding the bag, will not practically do much more than transfer purchasing power from the losers to the winners, and that the corporations whose stocks have been sold to such heights will not be more than momentarily affected, if at all. The report to which I refer speaks of the months before the middle of 1929 as the time when the boom in construction should be looked for by those carrying responsibilities of preparation for it.

Will the Railroads Be Prepared?

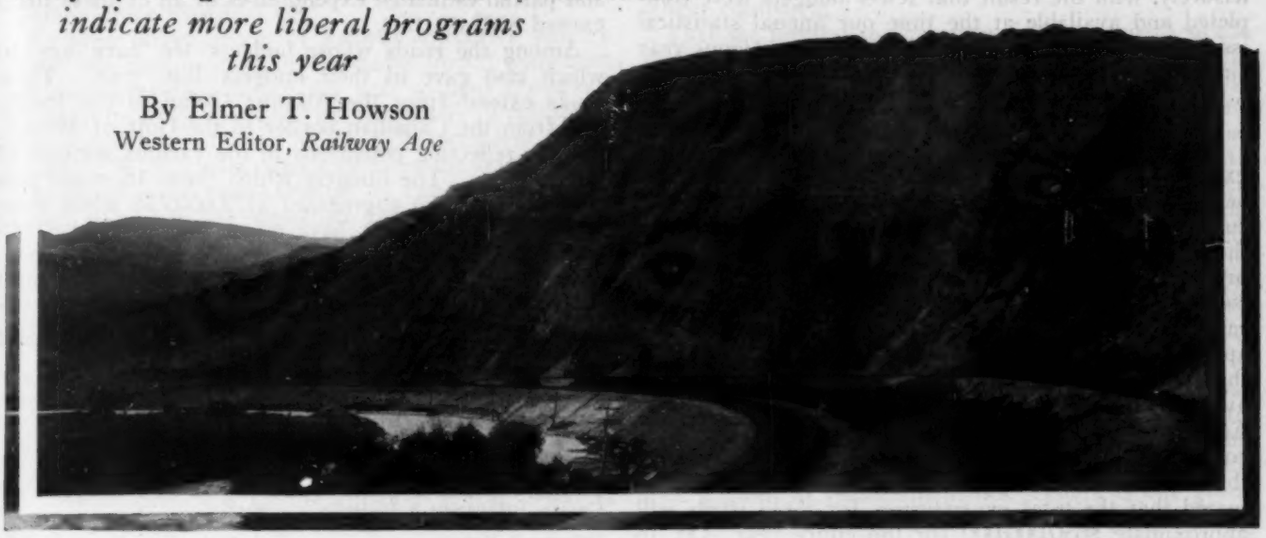
An important question is whether the railways will themselves accelerate the general advance by additions and betterments timed before the universal rush for material, supplies and labor has greatly increased cost of such improvements; not forgetting the opportunity, while traffic growth is tranquil, to bring up the average of mechanical modernization for operating economy—a standard in which there is now a wide spread between the most and the least progressive, even among the larger roads. The answer which the railways will make may be expected to depend upon the degree to which in each case their managers believe traffic growth will be faster and upon the confidence which they can inspire in those who must furnish the capital.

(*Continued on page 104*)

Railways Will Spend More in 1929

Study of budgets and comments of executives indicate more liberal programs this year

By Elmer T. Howson
Western Editor, *Railway Age*



Many Millions Are Being Spent For Line and Grade Revisions Like This

APPROXIMATELY $800,000,000 will be spent by the railways of the United States and Canada for equipment and for improvements to their properties, chargeable to capital account during 1929. In other words, the expenditures for these purposes will exceed those of the year that has just closed by more than $50,000,000. This forecast is based on a comparison of budgets furnished us last year and again this year, by roads extending into all parts of the country, supplemented by statements relative to the general outlook and to plans for their respective properties, given us by the executives of a number of the larger roads. In arriving at our conclusions, consideration has also been given to the views expressed by executives of other industries relative to the business outlook for 1929, nearly all of which point to increasing activity during the period we are now entering, as compared with that of a year ago.

The expenditures contemplated in this estimate are those involving improvements and additions to the railway properties, requiring the expenditure of additional capital, and are exclusive of still larger amounts that will be spent for the current repair and maintenance of the existing properties, chargeable to operating expenses. Since the conditions which promote active improvement programs also stimulate liberal maintenance activities, it may also be predicted that the roads will maintain and probably increase their expenditures for the current repair of their properties this year.

Our forecast of the expenditure of more than $800,000,000 for improvements during 1929 compares with a similar estimate made a year ago that $750,000,000 would be expended during the year that has just closed. At that time the railways were passing through a period of declining traffic, which began in the summer. This condition tended to curtail the improvement programs in contemplation a year ago, both by reducing the necessity for some of them and also by making their financing more difficult, with the result that the forecast of expenditures which we made a year ago indicated a decline from the activities of 1927.

Now conditions are reversed, for traffic is running considerably ahead of a year ago and the outlook is for continued heavy business through at least the first half of the new year, after which time the crops will exert a major influence. There is, therefore, a more optimistic attitude at present, supplemented in some quarters by a feeling that railway facilities may be taxed this year and that the provision of reserve capacity may now be the part of wisdom. Furthermore, the improvement in earnings during the closing months of 1928 has made the financing of improvements less difficult.

In Canada, conditions are even more promising, for they have been improving steadily during the last two years and the railways are sharing in the general revival of business. Last year was the most active in Canada from a railway standpoint since the war, and indications point to 1929 being even more active. The two major railway systems are establishing new high records for earnings and they are looking with optimism to the future. This is being evidenced particularly in their development programs in the Northwest.

Limitations of This Forecast

In a survey such as this, it is important that the reader keep in mind the limitations under which it must of necessity be prepared. The budget which a road prepares at the beginning of the year is an *estimate* of the work which it contemplates undertaking during the year. It is subject to revision at any time to meet new conditions that may arise without warning. Many, if not most, budgets are modified materially as the year progresses. Furthermore, the practice of preparing budgets is far from universal among the roads, for numerous important lines such as the New York Central and the Louisville & Nashville, prepare no budgets, but authorize expenditures at any time during the year that need for facilities arises and funds are available.

This year our survey is subjected to a further limitation which, while not new, is more pronounced than previously. This is the steadily increasing delay on the

part of the roads in completing their budgets. As they are no longer pressed for facilities to the extent that they must make an early start on their construction in the spring, they are developing their programs more leisurely, with the result that fewer budgets were completed and available at the time our annual statistical issue went to press this year than in any previous year since this survey was undertaken.

The Magnitude of the Program

Notwithstanding these difficulties, however, past experience has shown that the information that has been available has been sufficient to enable fairly accurate forecasts to be made of the degree of activity the roads would show in the improvement of their properties during the year then opening. Thus, in the issue of January 7, 1928, it was estimated that the railways of the United States and Canada would spend approximately $750,000,000 for improvements during that year. While final figures are, of course, not yet available for the entire year, the Bureau of Railway Economics has compiled data showing that the Class I roads of the United States alone spent $500,167,000 in the first nine months of 1928, from which it is estimated that the total expenditures for these roads will approximate $650,000,000 for the entire year. If to this figure there be added the similar expenditures made by other than Class I roads of the United States and also by the railways of Canada, the total expenditures made will not differ greatly from the estimate made at the beginning of the year. Likewise at the beginning of 1927, we estimated that the capital expenditures for that year would aggregate between $750,000,000 and $900,000,000 while the actual figure approximated $825,000,000.

The program of improvements contemplated for 1929 is noteworthy, not only by reason of its magnitude, but even more because it follows several years of similar activity. The expenditures of the Class I roads of the United States for the last nine years aggregate $6,628,296,000. By years, these expenditures were as follows:

Calendar Year	Amount
1920	$653,267,000
1921	557,035,000
1922	429,273,000
1923	1,059,149,000
1924	874,743,000
1925	748,191,000
1926	885,086,000
1927	771,552,000
1928 (last three months estimated)	650,000,000

Of the amounts included in the budgets for 1929, not all will be spent during the year. In some instances, the work is of such magnitude that its completion must of necessity extend over into 1930. In other cases, unexpected delays will retard operations. However, this is a normal condition, although the amounts carried over into the following year have decreased during the last two years. Thus, the total authorizations unexpended on October 1, 1928, aggregated $402,000,000, which amount was $25,000,000 less than on the corresponding date a year before. To arrive at the total amount *available* for expenditure during 1928, the appropriations carried over from the preceding year should of course, be added to those included in the budgets for the new year, although since an equivalent amount will probably be carried over unexpended into 1930, the amount that will actually be spent for improvements in 1929 will approximate that in the budgets.

In making our estimates, we were assisted by the budgets of 22 roads with a combined mileage of nearly 70,000, or nearly 25 per cent of the total of the United States and Canada. In addition, we have partial figures from other roads with 22,000 miles of lines. The total and partial estimated expenditures of all of these roads exceed $325,000,000.

Among the roads whose budgets we have are 16 which also gave us their budgets last year. These roads extend from the Atlantic Ocean to the Pacific and from the Canadian border to the Gulf of Mexico, thereby reflecting conditions in the various sections of the country. The budgets which these 16 roads prepared a year ago aggregated $172,660,756 while those which the same roads have now given us total $198,045,867. In other words, the expenditures contemplated by these 16 roads for 1929 exceed those planned by the same roads a year ago by $25,385,111, or 15 per cent. Among the budgets on which our estimates have been based are those of the following roads:

Atchison Topeka & Santa Fe.
Baltimore & Ohio
Bangor & Aroostook
Boston & Maine
Canadian Pacific
Chesapeake & Ohio
Chicago, Burlington & Quincy
Chicago, Indianapolis & Louisville
Chicago, Rock Island & Pacific
Delaware & Hudson
Norfolk & Western
Pere Marquette
Reading
Union Pacific System
Elgin, Joliet & Eastern
Gulf, Mobile & Northern
Lehigh Valley
Louisville & Nashville
Minneapolis, St. Paul & Sault Ste. Marie
Missouri-Kansas-Texas
New York, New Haven & Hartford
New York, Ontario & Western

Comments of Railway Executives

Supplementing these specific evidences of proposed activity, we have presented on preceding pages of this issue the views expressed by prominent railway executives on the improvement program outlook. Among the officers who have expressed their attitude regarding expenditures for improvements during the year now opening, it is noted there that only one or two look for any decline in expenditures for this purpose, while the others expect the present activity to be maintained or stimulated. Among those contemplating more liberal expenditures are A. C. Needles, president of the Norfolk & Western, who writes that "The capital expenditures of the N. & W. in 1929 will probably total about $16,000,000 for roadway and structures and $7,000,000 for equipment, a combined capital expenditure of approximately $23,000,000. This estimated amount is slightly larger than the annual capital expenditures of the last three years and slightly less than the capital expenditures of 1924 and 1925. In the period from 1923 to 1928, inclusive, the average yearly capital expenditure of the Norfolk & Western for roadway and structures was approximately $10,900,000 and for equipment approximately $6,500,000."

P. E. Crowley, president of the New York Central lines, expresses a similar opinion, for he states that the New York Central lines have spent upwards of $60,000,000 during the last year for additions and betterments, exclusive of equipment, and that they will spend at least that amount during the coming year for the same character of work. George Hannauer, president of the Boston & Maine, expects capital expenditures on that road in 1929 to equal or exceed those in recent years, while J. E. Gorman, president of the Chicago, Rock Island & Pacific, advises that while the equipment program has not yet been definitely determined, the budget contemplates greater capital expenditures than have been made during the last few years. "We have," he says, "increased our expenditures for improvements of roadway and structures, and for major improvements in the way of new lines and reduc-

tion in grades of existing lines." Another executive who shares these views is J. J. Bernet, president of the Erie, who advises that "assuming a satisfactory volume of business in the early part of 1929, capital expenditures will be as large as during recent years and possibly larger than in 1928."

An even larger group of railway executive officers expect the continuation of the same liberal programs that have prevailed during the past without a marked tendency to either increase or decrease. Typical of these comments, is that of W. R. Cole, president of the Louisville & Nashville, who expresses the opinion that "substantially the same amount of capital will be invested, at least in the immediate future as in the past," while J. E. Taussig, president of the Wabash, writes that "capital expenditures will, no doubt, be relatively as large in 1929 as they have been in recent years." Other railway presidents who share this view are Carl R. Gray of the Union Pacific System, W. B. Storey of the Santa Fe System, H. A. Scandrett of the Milwaukee, Fred W. Sargent of the North Western, C. Haile of the Katy and Daniel Willard of the Baltimore & Ohio.

Among those who take a less optimistic view is L. A. Downs, president of the Illinois Central, who, as quoted on a previous page of this issue, believes that the immediate future of railway capital expenditures is complicated by several important uncertainties, including the valuation question, the difficulty of revising the consolidation legislation and the demands for rate reduction. Somewhat less positive, but inclined toward the same attitude, is F. E. Williamson, president of the Burlington, who states that "unless a material increase in freight traffic appears on the horizon of the new year, there is no reason why the railroads should make larger capital expenditures than are necessary to maintain the status quo of service. By and large, this means that the investment in improvements in 1929 need not exceed that of 1928." E. G. Buckland, vice-president of the New Haven, holds somewhat the same view for he states that "the steady improvement in efficiency of operation during recent years has so materially increased the transportation capacity of the railways that it seems ample for the immediate future, at least, to handle adequately the prospective volume of traffic."

The Division of Expenditures

Of the expenditures that the railways will make for improvements, the division between roadway and equipment has been of increasing interest in recent years, because of the steadily declining proportion that has gone for equipment and the correspondingly increased share that has been allotted for roadway improvements. This tendency is shown in the following tabulation:

Year	Total Capital Expenditures	Expenditures for Equipment	Per Cent of Total	Expenditures for Roadway	Per Cent of Total
1923	$1,059,149,426	$681,723,991	64	$377,425,435	36
1924	874,743,228	493,608,460	56	381,134,768	44
1925	784,191,000	338,114,000	45	410,077,000	55
1926	875,000,000	380,000,000	43	495,000,000	57
1927	771,552,000	288,700,000	37	482,852,000	63
1928(first 9 months)	500,167,000	165,967,000	33	334,200,000	67

That this division will, in general, continue is indicated by the comments made by practically all of the executives who have written us. Their position is summarized by H. A. Scandrett in his statement that "our capital expenditures for equipment have declined since the high point in 1923, while the gross capital expenditures for road have increased. I attribute this in part to the necessity of putting equipment in condition after the return of the property from federal control, and to its more intensive use, as reflected by the yearly increase in average miles per car per day, and the longer engine runs. Another factor is the decline in passenger business, which has restricted the purchase of new passenger equipment."

That the interest in equipment is not as small as the above statements might indicate, however, is shown in the fact that the plans of 14 of the larger roads, whose equipment budgets we have for 1929 and also for last year, show contemplated expenditures for equipment this year of $56,839,000 as compared with similar estimates of $51,566,000 a year ago, or 10 per cent larger. The large orders for equipment placed during the closing weeks of the year and the equally large inquiries now outstanding afford positive evidence in support of the belief that the equipment purchases this year will exceed those of 1928 by a considerable margin.

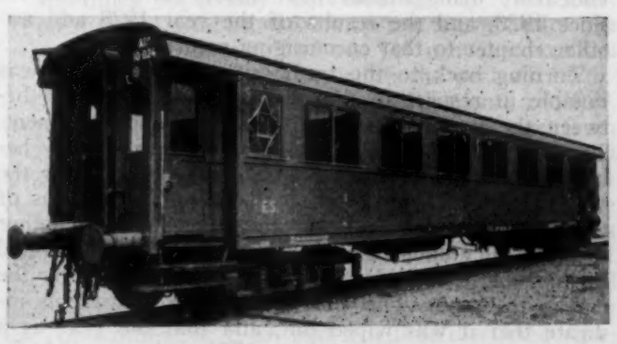
The budgets received this year are not sufficient in number to permit detailed analysis of the character of the improvements that will be made, for while one road contemplates the construction of second track or the reconstruction and enlargement of yards, another plans to strengthen bridges on certain lines or to provide new stations at important points. There is one group of expenditures, however, that is making increased demands on practically all roads—the separation of grades with important highways or streets, a form of expenditure that provides little or no return on the investment. The magnitude of this demand is shown by provisions made in the budgets of a few widely separated roads as follows:

Boston & Maine	3 points	$605,000
Chicago & Eastern Illinois	3 points	197,000
Chicago, Rock Island & Pacific	17 points	419,000
Delaware & Hudson	10 points	1,529,000
Soo Line	15 points	225,000
New York, New Haven & Hartford		800,000
Pere Marquette	4 points	500,000
Reading	10 points	565,000
Union Pacific	8 points	1,700,000

Summary

As the railways enter the new year, they are in a better condition than ever before to meet the transportation needs of the country. They have capacity sufficient to meet any demands that may reasonably be expected during the year. Their properties are in the best condition as regards maintenance in their history. The magnitude of the programs that are now being developed demonstrates the determination of railway managements to maintain this favorable condition and also to continue to make those improvements which will reduce the cost of handling traffic. All indications point to 1929 being another good year for the roadway department and a better one for the equipment field than those which have immediately preceded it.

* * *



First Class Steel Coach Built by Ernesto Breda for the Italian State Railways

A Review of Railway Operations in 1928

Sharp upturn in freight business in late months improves showing of otherwise disappointing year

By Julius H. Parmelee
Director, Bureau of Railway Economics

RAILWAYS of the United States will in future think of the year 1928 as the year of the sharp upturn in freight traffic during the fall months. This increase in traffic during the second half of the year, following hard upon the heels of a half year when all the traffic trends were discouraging, brought the year to a close in better traffic and financial position than any observer would have believed possible at the middle of the year.

This is perhaps the outstanding feature of the year, from a railway point of view. From the broader public point of view the one feature of compelling interest is the continued advance of the railways toward a higher level of operating efficiency.

Analysis of the several factors of railway performance during the past six years brings out clearly the progressive gain of the railroads each year since 1923, the date when the railways made effective their program for improvement of railway operation.

This program has been applied each year since 1923, with a persistence and intelligence that has borne fruitful results. Each year since 1923 has shown a general improvement in railway efficiency, reaching a higher level in 1928 than ever before.

Part of the credit for this improvement goes to the railways for laying down and carrying out a program for physical improvement, applied to the fixed plant and to equipment, which has called for the investment of five billions of dollars of new capital in the railway plant since the beginning of 1923. Part is due to the effort of railway managements to improve every possible factor of performance, such as trainload, speed of movement, adequacy of motive power and equipment, elimination of car shortages and delays, and every possible reduction in the field of waste, such as waste of fuel, waste represented by loss and damage to freight and other property, and that most important waste of all represented by the loss of and injury to human beings in railway accidents. In every line of endeavor, managements have made marked progress since 1923, and the results of the year 1928 add another chapter to that encouraging record.

Turning back to the traffic situation, the year was notable in respect to the almost exact separation between the two halves as to freight traffic movement. To the middle of the year, the traffic ran steadily behind that of 1927; from the middle to the end of the year, it ran as steadily ahead, and the last months of the year developed an interesting race, to see whether the deficiency under the preceding year which had piled up to June 30 would or would not be made up by the end of the year. The final estimates now available indicate that it was wiped out, and that the year as a whole will rank second only to 1926 with respect to its freight traffic volume.

The financial factors ran closely parallel to the traffic factor. Operating revenues were less than in 1927 during the first six months, but were greater during the second six months, although the total revenues for the year fell somewhat below the preceding year. Net operating income for the first six months was also considerably below that of 1927, while the second six months more than made up the decrease, and the year closed with an increase for the whole of the twelve months.

Even so, the rate of return on property investment remained considerably below five per cent. Although it showed some improvement over 1927, the rate was no greater than 4.65 per cent.

It can hardly be overemphasized that any improvement made by the railways in their efficiency of operation, or in their financial position at any time, while it redounds in the first instance to them, is of even greater importance in its beneficial effect on the industries of the country. This point has been made many times by economists, government officials, and observers outside the railway industry, but it should never be overlooked in any consideration of railway accomplishment.

This point is forcefully brought out in the latest annual report of the Secretary of Commerce, in the following brief quotation:

> The most conspicuous aspect of railway transportation during recent years has been the steady improvement in the quality of the service rendered. Especially important is the fact that cars have been made available promptly when needed. The chronic shortages which were characteristic of the war years and those immediately following have been wholly done away with. Equally beneficial to the shippers and receivers of freight and indirectly to the consumers of commodities has been the gain in the rapidity of transportation and delivery. It is estimated that the time required for a given shipment is now at least one-third less than at the close of the war. This improvement in railway service has reduced the costs and risks of industry and of distribution. It has made it possible to do business without carrying excessive stocks of commodities.

General Summary

Summarizing these and other factors of the railway situation in 1928, the outstanding features were as follows.

1. Freight traffic for the year was almost exactly the same as in 1927. The traffic for the first six months was about four per cent below that of the corresponding period of 1927, while the traffic of the second six months was about four per cent above 1927.

2. Passenger traffic declined in every month of 1928, the decrease for the year being about six per cent.

3. Operating revenues declined less than one per cent. There was a large decline during the first six months, and an increase during the second six months.

The gross revenues of 1928 were less than in 1923, 1926, and 1927, but were greater than in any other preceding year.

4. Operating expenses were reduced by economical management and by the increased efficiency methods, to the extent of 3.2 per cent. bringing the total expenses of the year below that of any preceding year since 1922.

5. The operating ratio, which stood at 72.6 per cent in 1928, was lower than any year since 1917, and marked a real achievement on the part of the railways with respect to their ability to control their expenses.

6. Net railway operating income amounted to $1,180,000,000, which was an increase over 1927 of 95 millions, but was less than in 1926 by 53 millions.

7. Railways earned a rate of return on property investment of 4.65 per cent in 1928. This rate was higher than in 1927, but lower than in 1925 and 1926.

8. The railways attained maximum levels of performance in at least nine factors of efficient operation, and reached a high level of performance in many of the other factors.

9. General railway efficiency in 1928 was on a higher level than in any year since the war, as indicated by an index of the principal significant factors of railway efficiency.

The Traffic of 1928

Freight and passenger traffic in 1928 showed quite different tendencies. The freight business took a sharp drop in the first half of the year, then came back as sharply. Passenger business was off throughout the whole year.

The freight traffic story falls into two distinct periods of six months each. From January to June both carloadings and ton-miles ran consistently below the corresponding months of 1927, while from July to the end of the year they ran as consistently ahead. As a result, the totals for the year are almost the same as in 1927.

Revenue carloadings approximated 51,600,000 cars. This was slightly under 1927, and 2.8 per cent less than the peak reached in 1926, but greater by 1.5 per cent than the five-year average to 1927.

Table I

COMPARATIVE TRAFFIC RESULTS

Revenue Carloadings	
1928	51,600,000
1927	51,633,000
1926	53,099,000
5-year av. 1923–1927	50,861,000
Net Ton-Miles	
1928	475,000,000,000
1927	474,683,000,000
1926	488,702,000,000
5-year av. 1923–1927	461,345,000,000
Passenger-Miles	
1928	31,500,000,000
1927	33,655,000,000
1926	35,499,000,000
5-year av. 1923–1927	35,849,000,000

Net ton-miles amounted to 475 billions. This was approximately the same as in 1927, and 2.8 per cent below the 1926 peak, but 2.9 per cent above the five-year average.

Passenger-miles fell 6.4 per cent below 1927, and by varying percentages were less than in all previous years back to 1909. Compared with the peak reached in 1920, the passenger service of 1928 showed a decline of 32.8 per cent, or almost one-third.

Table I is the basic table that supplies the principal basis for these comparisons. It gives the traffic results for 1928, 1927, 1926, and the five-year annual average from 1923 to 1927.

The revenue carloading figures are compilations of the Car Service Division of the American Railway Association. Net ton-miles are based upon reports of the Interstate Commerce Commission, and include both revenue and non-revenue movement. The passenger-miles are also based upon reports of the Commission, and include revenue movement only.

Some of the entries for 1928 in this table, and throughout the remainder of this review, are partially estimated, and will be subject to revision when final returns for the year 1928 become available. All the statistics here reviewed relate to railways of Class I.

Carloadings

As this review is written, with carloading returns for 50 of the 52 weeks of the year in hand, total loadings, for 1928 appear to have aggregated 51,600,000 cars, equivalent to an average of 992,000 per week. This is a fractional per cent below the corresponding total and weekly average for 1927.

The average weekly loadings, for the ten-year period from 1919 to 1928, show the following generally rising trend:

1919	804,000	1924	933,000
1920	868,000	1925	985,000
1921	756,000	1926	1,021,000
1922	831,000	1927	993,000
1923	958,000	1928	992,000

Eliminating annual fluctuations, the net increase for the period as a whole was from a weekly average of 804,000 cars in 1919 to 992,000 cars in 1928, or 23 per cent. This marks the forward march of industry in the United States since the close of the war.

The loadings of individual weeks and months also throw light on our economic expansion. Freight loadings never reached a million cars in any one week prior to 1920. In that year, however, five million-car weeks were reported. None occurred in 1921 and 1922. The five years from 1923 to 1927 reported a total of 107 million-car weeks, or about 21 per year. We have now come to expect at least 20 such weeks each year. In 1928 there were 24 million-car weeks, compared with the previous high totals of 28 weeks in 1927 and 27 in 1926.

Considering the loadings of individual weeks, successive peaks have been reached from time to time during the past ten years, beginning with a peak of 991,980 cars in 1918, passing the million mark for the first time in 1920, and ending with a much higher peak of 1,208,878 cars in 1926. The high peak of 1927 reported 1,128,486 cars. The peak in 1928 occurred during the week ending September 29, when 1,196,768 cars were loaded. This was 6 per cent above the high week of 1927, but was about one per cent below the peak of 1926, which is the record week to date.

Ton-Miles

Ton-miles apparently increased slightly over 1927. The estimated total of 475 billion net ton-miles for the year was about one-tenth of one per cent greater than in 1927, but was 2.8 per cent below the peak of 1926.

Chart A shows the ton-miles of each month of 1928, compared with 1927 and the five-year average from 1923 to 1927. A survey of the curves for 1927 and 1928 brings out very clearly the contrast between the two halves of the year, the curve for 1928 being below that for 1927 until June, then turning upward across the 1927 curve and remaining above it to the close of the year. This phase of the freight business of 1928 is so striking, and carries so great a significance as to the possibilities for 1929, that it will be discussed separately and in some detail in the next section.

Both factors of freight movement—carloadings and

ton-miles—showed a different trend in the second half of 1928, compared with the first half. The first six months of the year reported consistent decreases under 1927, while the second six months as consistently reported increases. In some ways this was the outstanding traffic feature of the year.

Take the carloading statistics. Virtually every week of the first six months of 1928 showed a smaller traffic

NET TON-MILES, BY MONTHS
(5-year average 1923-1927, and years 1927 and 1928)

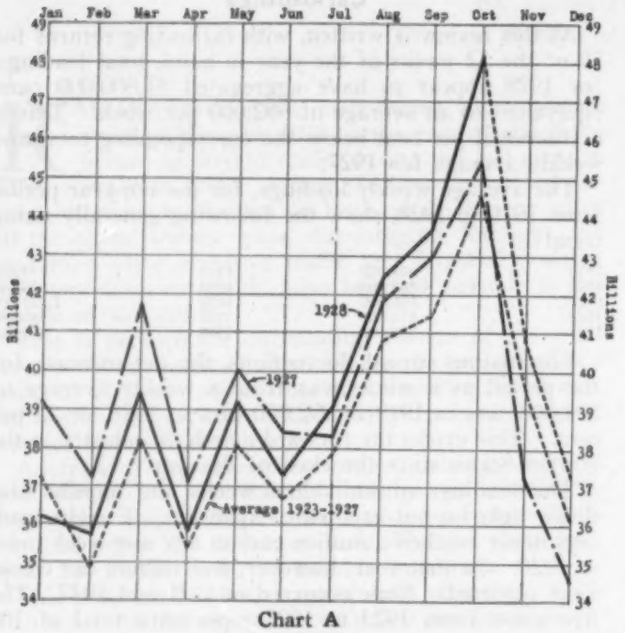


Chart A

than during the corresponding week of 1927. The spread between the two years grew steadily, reaching its greatest figure in the week ending June 30; the cumulative loadings to that date were fewer in 1928 than in 1927 by 1,063,935 cars. Beginning with the first week in July, however, this deficiency grew smaller and smaller, until it was practically wiped out by December 31.

Table II brings out the fact that the percentage of decline was greatest during the early months, and that the later months gradually cut this to zero. This table is on a cumulative basis, by months.

Table II

CARLOADINGS, 1928 COMPARED WITH 1927

To end of—	Per Cent Decrease
January	8.2
February	6.9
March	6.0
April	5.4
May	4.8
June	4.2
July	3.5
August	3.0
September	2.4
October	1.6
November	0.6
December	0.1

Much the same story is revealed in the statistics of ton-miles. Each of the first six months of the year showed a decline under 1927; each of the second six months showed an increase. The cumulative percentage of decline grew steadily smaller month by month, until it struck zero by the end of the year.

To indicate this feature from another angle, we may compare the two halves of the year against the corresponding halves of 1927. Carloadings of the first half decreased 4.2 per cent, while those of the second half increased 3.9 per cent. Ton-miles declined 4.3 per cent during the first six months, and increased 4.4 per cent during the second six months.

A more striking presentation of this situation may be had by computing the increase or decrease in carloadings on the basis of a three-month "moving average." This method compares any two years by averaging successive periods of three months each, passing from one period to the next by dropping the first month of the three, and adding another at the end. On this basis, the marked difference between 1927 and 1928 may be brought out, the upward trend in 1928 is emphasized, and the future possibilities for 1929 are indicated.

Table III presents a three-month moving average of carloadings for the years 1927 and 1928, the percentages shown being the rate of change (increase or decrease) compared with corresponding periods one year earlier.

Table III

MOVING AVERAGE OF CARLOADINGS

Period	Per Cent Change
Jan.-Mar. (1927)	I 3.4
Feb.-Apr.	I 3.1
Mar.-May	I 1.5
Apr.-June	D 0.5
May-July	D 3.3
June-Aug.	D 3.9
July-Sep.	D 4.1
Aug.-Oct.	D 4.6
Sep.-Nov.	D 6.6
Oct.-Dec.	D 7.6
Nov.-Jan. (1928)	D 8.4
Dec.-Feb.	D 7.0
Jan.-Mar.	D 6.2
Feb.-Apr.	D 4.6
Mar.-May	D 3.6
Apr.-June	D 2.6
May-July	D 1.1
June-Aug.	D 0.5
July-Sep.	I 0.1
Aug.-Oct.	I 2.2
Sep.-Nov.	I 5.5
Oct.-Dec.	I 7.3

The first three months of 1927 showed an increase of 3.4 per cent over the previous year. In the next period (February-April) the increase fell to 3.1 per cent, and then to 1.5 per cent. The next period slipped into a de-

MOVING AVERAGES OF CARLOADINGS - 1927 AND 1928
Per cent of Increase or Decrease over
Corresponding Period of Preceding Year

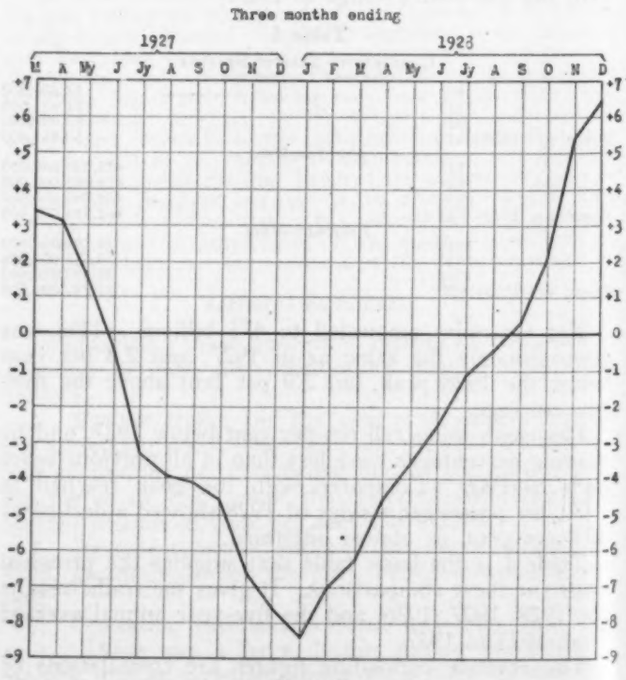


Chart B

crease of 0.5 per cent, and this decrease gradually rose to its high point of 8.4 per cent in the period which included November and December, 1927, and January, 1928. This marked the turning point, for the rate of decrease began to decline, and so continued until the three months ended August, 1928. Here the upward swing again started, and rose steadily to the close of the year.

In brief, the two years reveal exactly opposite trends. Freight traffic started on a high level in 1927, then slumped. In 1928 it started in the midst of the slump, then swung upward.

To emphasize this difference in trends, Chart B is presented. The curve runs consistently downward through 1927, and consistently upward through 1928. Both curves cross the zero line—that is, the line showing parity with the preceding year—at about the middle of the year.

Strongly as this chart emphasizes the differences between the two years, it possesses an even greater significance in its implications for 1929. Had Chart B been in existence in 1927, with the curve to December drawn on it, any analyst could have looked at the downward curve to that point and predicted that it would probably continue downward for a time before turning upward again. Without indicating the exact date when the turn would come, the curve showed signs of some continuation downward.

The curve is now reversed, and we may easily mark its steady climb from a low point at the beginning of 1928 to a high point at the end. With all the dangers of prophesy in mind, we may express the belief that the curve will continue upward for a few months longer before it takes another and inevitable downward swing. Whether these "few months" will be the first two months of 1929, or four, or six, is a question, but it seems more likely to be six than two.

Loadings According to Commodities

Table IV distributes the carloadings of 1928 among the eight general groups according to which they are classified by the Car Service Division.

To supply a basis of comparison with previous years, the percentage distribution is shown for 1928, and also for 1927 and 1926.

Table IV

DISTRIBUTION OF COMMODITY CARLOADINGS

	1928		1927	1926
	Number	Percent		
Grain and products	2,514,000	4.88	4.61	4.51
Live stock	1,535,000	2.97	3.00	3.01
Coal	8,810,000	17.07	17.88	18.62
Coke	534,000	1.03	1.06	1.30
Forest products	3,439,000	6.66	6.66	6.86
Ore	1,895,000	3.67	3.66	4.10
Mdse. L.C.L.	13,099,000	25.40	25.65	25.24
Misc.	19,774,000	38.32	37.48	36.36
Total	51,600,000	100.00	100.00	100.00

Survey of the table indicates the lines along which freight traffic made the most progress in 1928. Grain and grain products, ore, and miscellaneous products all represented greater proportions of the total movement in 1928 than in 1927; livestock, coal, coke, and merchandise represented smaller proportions. Comparing the trend for three years, 1926 to 1928, the significant features are the growing proportions of grain and grain products and of miscellaneous products, contrasted with a constantly falling proportion of coal. These trends may have significant implications in the field of future traffic growth on our railways.

Considerable attention has already been devoted to the fact that the freight traffic of the first half of 1928 declined, while that of the second half increased. That is the fact, as disclosed by the statistical aggregates. To ascertain the reasons for the change, we may consider the statistics of commodity groups. Table V shows the percentage comparison for each group, on the basis of each half of the year 1928.

Table V

COMMODITY LOADINGS, BY SIX-MONTH PERIODS

	Per Cent Change, 1928 against 1927	
	Jan.-June	July-Dec.
Grain and products	I 4.7	I 6.5
Livestock	I 0.3	D 1.8
Coal	D13.4	I 4.9
Coke	D 9.6	I 5.8
Forest products	D 4.3	I 4.4
Ore	D20.0	I15.0
Mdse. L.C.L.	D 1.2	D 0.6
Miscellaneous	D 1.3	I 5.6
Total	D 4.2	I 3.9

Only grain and merchandise showed consistent trends in the two halves of the year, one increasing and the other decreasing in both periods. Livestock first increased then declined. All other products decreased, then increased. In percentage terms, the most striking changes occurred with respect to ore, which declined 20 per cent to June, then (aided by a later shipping season in 1928) increased 15 per cent between July and December. The next most important percentage change was that of coal, from a decline of 13.4 per cent to an increase of 4.9 per cent; this change reflects the reverse situation in 1927, when coal moved more heavily in the first six than in the latter six months of the year.

In terms of total loadings, the striking changes brought out in Table V are those of miscellaneous products, the largest commodity group; and in coal, which is also an important group. These shifts from a low to a higher basis as the year lengthened explain the outstanding phenomenon of the mounting freight traffic figures of 1928.

Passenger Decline Continues

Revenue passenger-miles in 1928 were less by 6.4 per cent than in 1927, and fell to a point 32.8 per cent below the record level of 1920. In fact, one must turn back to the year ended June 30, 1909, to find a smaller aggregate demand for passenger service than that of 1928. This decline has been accompanied, of course, by an almost steady reduction in passenger revenue. For the first time in ten years, aggregate passenger revenues in 1927 fell below a billion dollars. In 1928, they declined still further to 900 millions.

What makes the situation worse than these gross statistics indicate is that the bulk of the decline in 1928 was in the non-commutation branch of the passenger service. That part of the passenger business represented by commutation train service into the larger cities nearly held its own with 1927; the non-commutation traffic, including regular local and long-distance passenger trains, showed a decline (to October 1) of about eight per cent. This is where the competition of the private and common carrier motor car has made its principal inroads. Travel in Pullman cars also declined in 1928, but not to the extent of the decrease in day coach travel.

Financial Results

With freight traffic barely holding its own in 1928, and passenger traffic showing an appreciable decline, revenues were bound to fall. Operating revenues amounted to $6,166,000,000, which was a decrease of 41 million dollars, or 0.7 per cent, under 1927.

Operating expenses aggregated $4,478,000,000, which was a reduction of 149 million dollars, or 3.2 per cent.

The operating ratio, or percentage relationship between revenues and expenses, showed a decrease under

1927, falling from 74.5 to 72.6 per cent. The ratio progressively declined each year from 1920 to 1926, turned slightly upward in 1927, and has now fallen again. This ratio of 72.6 per cent for 1928 is the lowest in eleven years, or since 1917.

Railway taxes in 1928 amounted to $390,000,000, an increase of $9,400,000, or 2.5 per cent, over 1927. This increase occurred in face of decreased gross revenue, and brought the ratio of taxes to gross revenue to a higher point than ever before. The ratio was 6.3 per cent in 1928, as against 6.1 per cent in 1927. That is, 6.3 cents of every dollar of operating revenue last year went to the Federal, state, and local governments for taxation purposes.

Thus revenues and expenses both declined in 1928, but the greater reduction in expenses brought about an increase in net railway operating income, which amounted to $1,180,000,000. This was an increase of 95 million dollars, or 8.7 per cent, over 1927. It was less, however, than the net income of 1926 by 53 millions.

The rate of return on investment is computed by relating net operating income on a percentage basis to the aggregate of the road and equipment account, materials and supplies, and cash. This relative measure of the financial results of 1928 indicated a rate of return of 4.65 per cent. The rate earned last year was higher than in 1927, but somewhat under the corresponding rate in 1926. It was slightly greater than the annual rate of return for the five years to 1927, which averaged 4.50 per cent. No rate from 1920 to 1928 reached a level of five per cent; in six of the years the rate was between four and five per cent; it stood once between three and four per cent, once between two and three per cent, and once dropped below one per cent.

In the following table, all the rates of return are computed on the basis of the investment reported at the end of the year, except the rate for 1928. Because the necessary statistics are not yet in hand, the 1928 rate is based on the investment as it stood at the beginning of that year. If computed on the end-of-the-year investment, it would be slightly below 4.65 per cent.

	Rate of return on investment
1920	0.21%
1921	2.84
1922	3.58
1923	4.33
1924	4.21
1925	4.73
1926	4.98
1927	4.28
1928	4.65

The rates of return on investment for the three districts in 1928 were approximately as follows: East, 5.13 per cent; South, 4.04 per cent, and West, 4.32 per cent.

Table VI summarizes in condensed form the revenues, expenses, taxes, net operating income, and rate of return of Class I carriers as a whole, comparing the year 1928 with 1927 and with the five-year period 1923 to 1927.

Table VI

CONDENSED INCOME ACCOUNT

	1928 (millions)	1927 (millions)	Average 1923-1927 (millions)
Total operating revenues	$6,166	$6,207	$6,241
Total operating expenses	4,478	4,627	4,689
Taxes	390	381	364
Net operating income	1,180	1,085	1,085
Return on property investment	4.65%	4.28%	4.50%

Operating Revenues

Operating revenues declined 0.7 per cent under 1927, and were 1.2 per cent below the preceding five-year average. Freight and mail revenues increased; other classes of revenue declined. The greatest relative decrease occurred in passenger revenue, which fell off 7.8 per cent. This compares with a decline of 6.4 per cent in passenger traffic.

Freight revenue showed the greatest amount of increase, 33 millions in dollars, and 0.7 in percentage. Mail revenue increased six millions.

Table VII summarizes the component items of operating revenue, the returns for 1928 being compared with 1927 and the five-year period 1923 to 1927.

Table VII

OPERATING REVENUES

	1928 (millions)	1927 (millions)	Average 1923-1927 (millions)
Freight revenue	$4,682	$4,649	$4,599
Passenger revenue	900	976	1,060
Mail revenue	102	96	96
Express revenue	141	143	147
All other revenue	341	343	339
Total	$6,166	$6,207	$6,241

Operating Expenses

Operating expenses were reduced 149 million dollars under 1927, or 3.2 per cent, and were 4.5 per cent under the annual average of the preceding five-year period.

The three largest classes of operating expense declined in 1928, namely, maintenance of way, maintenance of equipment, and transportation. Transportation showed the greatest reduction in amount, but the smallest in percentage. Maintenance of equipment showed the next largest reduction, while maintenance of way declined the least in dollars. The two maintenance accounts combined were below the corresponding total for 1927 by 87 million dollars, or 4.1 per cent, while transportation expenses declined 69 millions, or 3.2 per cent.

The way in which, and the extent to which, the railways in 1928 kept their operating expenses in hand and reduced them by larger amounts than the decline in revenues, stands out among the financial features of the railway year. Only these reductions saved the net from a decrease. Yet these same reductions were not made at the expense of operating efficiency, as later paragraphs will show.

Table VIII summarizes the various items of operating expense in 1928, compared with 1927 and the five-year average.

Table VIII

OPERATING EXPENSES

	1928 (millions)	1927 (millions)	Average 1923-1927 (millions)
Maintenance of way	$847	$878	$841
Maintenance of equipment	1,173	1,229	1,308
Traffic	124	121	107
Transportation	2,099	2,168	2,216
General and other	235	231	217
Total	$4,478	$4,627	$4,689

Receipts per Traffic Unit

Average receipts per ton-mile and per passenger-mile, for each year from 1921 to 1928, are presented in Table IX. These averages measure with a rough degree of accuracy the respective price levels of the two principal kinds of transportation service rendered by the railways. Even so, the character of the traffic must be taken into consideration; when the proportion of such low grade commodities as coal, coke and ore in the total traffic grows smaller, the tendency is to increase the average receipts per ton-mile. This occurred in 1928, and the average increased slightly over 1926 and 1927, although lower than in any previous year back to 1921.

Receipts per ton-mile in 1928 averaged 1.085 cents, which was one-half of one per cent more than in 1927. The average for 1928 was 14.9 per cent below 1921, the year of highest post-war averages.

Average receipts per passenger-mile, standing at 2.850 cents in 1928, fell 1.6 per cent below 1927, and 7.6 per cent below 1921.

Table IX

RECEIPTS PER TON-MILE AND PASSENGER-MILE, 1921-1928

	Receipts per ton-mile (cents)	Receipts per passenger-mile (cents)
1921	1.275	3.086
1922	1.177	3.027
1923	1.116	3.018
1924	1.116	2.978
1925	1.097	2.938
1926	1.081	2.936
1927	1.080	2.896
1928	1.085	2.850

Capital Expenditures

Gross capital expenditures of the railways during the past six years have aggregated nearly five billions of dollars. The total for 1928 is estimated at $650,000,000, somewhat below the six-year average of $831,000,000 per year. The expenditures by years are as follows:

1923	$1,059,149,000
1924	874,743,000
1925	748,191,000
1926	885,086,000
1927	771,552,000
1928	650,000,000
Total	$4,988,721,000

Unexpended authorizations of capital expenditures were brought over from 1927 into 1928, amounting to $324,000,000. Additional authorizations were made during 1928 of $676,000,000. This made a grand total of a billion dollars of authorized expenditures under way during the year. Actual expenditures during the year were $650,000,000, leaving a carry-over of $350,000,000 into 1929.

The capital expenditures of 1928 were assigned in the proportions of $235,000,000 to equipment and $415,000,000 to roadway and structures.

The proportion of total capital expenditures going into equipment, as contrasted with roadway and structures, declined each year from 1923 to 1928. The proportion was 64 per cent in 1923, fell to 37 per cent in 1927, and again declined to about 36 per cent in 1928. For the six years as a whole, capital expenditures were more evenly divided, about 48 per cent being devoted to equipment and 52 per cent to roadway and structures.

Locomotive and car installations were smaller in number than in 1927. Aggregates for eleven months were 1,258 locomotives in 1928 and 1,820 in 1927. Corresponding eleven-month totals for freight cars were 50,926 in 1928 and 67,985 in 1927. The number of passenger car installations for nine months was 1,594 in 1928, compared with 1,851 in 1927. In addition, there were installed during the eleven months 3,456 railroad owned but privately controlled refrigerator cars.

Retirements during 1928 (eleven months) numbered 2,913 locomotives, 2,140 passenger cars, 76,682 freight cars, and 1,920 railroad owned and privately controlled refrigerators.

The locomotives installed in 1928 averaged 51,245 pounds of tractive effort. The locomotives retired, on the other hand, averaged only 30,600 pounds. Although the retirement of locomotives was more than twice as great in units as the installations, the aggregate tractive power of the new units was more than two-thirds as great as that of the retired units. The average power of locomotives in service increased from 42,674 pounds per locomotive at the end of 1927 to 43,384 pounds on October 31, 1928.

The new freight cars had an average capacity of 49.3 tons, whereas the units retired averaged only 40.4 tons. Although the aggregate capacity of all freight cars in service declined during 1928, average capacity per car rose slightly, from 45.7 tons at the close of 1927 to 45.8 tons on October 31, 1928.

Statistics of unfilled orders for new equipment at or near the close of 1928 showed some increase. Locomotives on order at the end of November numbered 123, compared with 69 on the same date in 1927, while the number of freight cars on order was 13,150, compared with 9,721 in 1927. Passenger cars on order rose from 709 on September 30, 1927 to 1,173 in 1928.

Operating Efficiency

Railway operating efficiency as a whole set a new level in 1928. Several of the factors of efficiency broke all records, while the others compared favorably with preceding years. This was another step forward in the progress of the railways since 1923, when they inaugurated their program of improvement in facilities and in operation.

Statistics have already been presented with respect to the capital expenditures of 1928, and the extent to which those expenditures since 1923 have been devoted to new equipment. To show that the smaller proportions assigned to equipment in 1927 and 1928 have not prevented the roads from handling their traffic effectively, we may first consider the reserves of motive power and of freight car capacity in 1928, and the remarkable reduction in freight car shortages.

At all times during the past five years, a reserve of motive power and of freight cars has existed. Both the traffic of these five years, and the amount of equipment in reserve, have been greater than ever before.

Tables X and XI summarize the reserve equipment situation. Table X shows, for the first of each month, the number of stored locomotives. Table XI is a corresponding statement with respect to surplus freight cars. Comparisons are made with 1927 and with the five-year average.

The number of locomotives reported as stored are those in good physical condition and potentially ready for service at all times. All types of engines are included.

Stored locomotives in 1928 ran from a minimum of 4,958 on November 1 to a maximum of 7,490 on January 1. Both the minimum and maximum were higher than the corresponding extremes of 1927, which were 4,600 and 6,754, respectively.

These statistics of minimum and maximum number of stored engines do not tell the complete story. What was the average reserve of motive power during the year? The number of stored locomotives averaged 6,700 in 1928, compared with 5,828 in 1927, and an average of 4,778 for the five-year period. Although the reserve declined toward the end of 1928, as the freight

Table X

STORED LOCOMOTIVES, FIRST DAY OF EACH MONTH

	1928	1927	Average 1923-1927
January	7,490	4,601	3,982
February	7,307	4,666	3,699
March	7,180	5,124	3,986
April	7,276	5,792	4,799
May	7,136	6,212	5,259
June	7,161	6,320	5,463
July	7,117	6,219	5,643
August	6,982	6,663	5,601
September	6,504	6,251	5,280
October	5,661	6,720	4,658
November	4,958	5,520	4,273
December	5,560	6,695	4,780

traffic increased, yet it remained adequate at all times to protect the service, and the average for the year was 15 per cent above that of 1927.

Chart C is the graphic statement corresponding to Table X. The curve for 1928 ran generally downward, but did not cross the 1927 curve until October. Compared with the five-year average, the margin was in favor of 1928 throughout.

Table XI relates to cars reported as idle, or surplus, during the first week of each month in 1928, 1927, and the average for five years. These statistics are reported for four periods per month.

Surplus cars in 1928 ranged from a minimum of 85,825 on October 14, to a maximum of 461,669 in January. Both these extremes were below the corresponding extremes of 1927, which were 135,059 and 464,005, respectively.

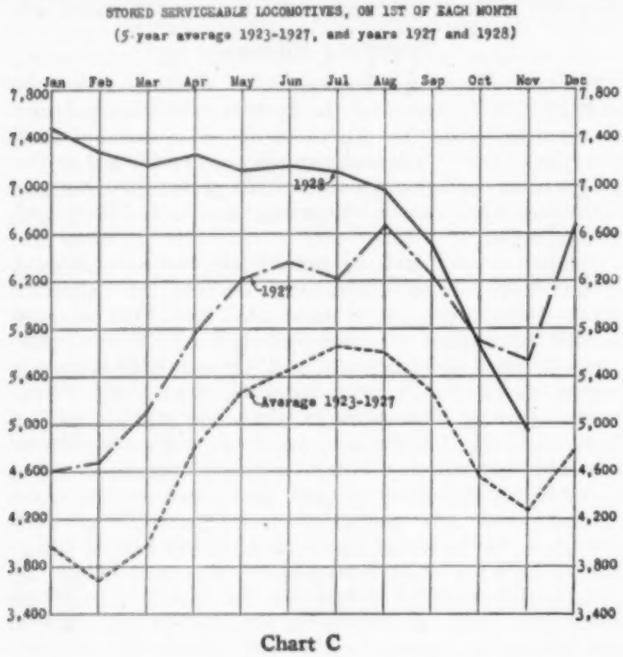


Chart C

The average number of surplus freight cars in 1928 (to December 7) was 279,526, compared with a surplus of 260,958 cars during 1927, and 200,295 cars during the five years. The average for 1928 thus ran seven per cent above that for 1927.

Table XI

FREIGHT CAR SURPLUS, FIRST WEEK OF EACH MONTH

	1928	1927	Average 1923-1927
January	461,669	326,837	222,517
February	369,469	257,767	177,592
March	352,854	267,616	198,099
April	344,731	254,095	241,419
May	301,897	245,113	237,891
June	318,370	274,062	253,571
July	332,317	282,559	246,706
August	257,212	254,324	190,351
September	188,795	175,704	134,854
October	92,203	142,678	98,593
November	129,151	207,757	150,930
December	256,995	385,748	257,076

This story in graphic form is presented in Chart D, which gives the average daily freight car surplus during each month of 1928, 1927, and the five years. As in the case of locomotives, the curve ran generally downward in 1928, with an upward turn in November.

Car Shortages Disappear

Statistics of car shortage are corollary to those of car surplus, and bring out the adequacy of railway equipment from another angle. This phase of railway statistics for 1928 marks a bright chapter in the efficiency record, for car shortages virtually disappeared.

Car shortage reports, like those of surplus, are made four times per month. Of 45 compilations so made to December 7th, seventeen showed no shortage whatever. No shortage of cars occurred at any time during the month of April. The largest shortage reported in 1928

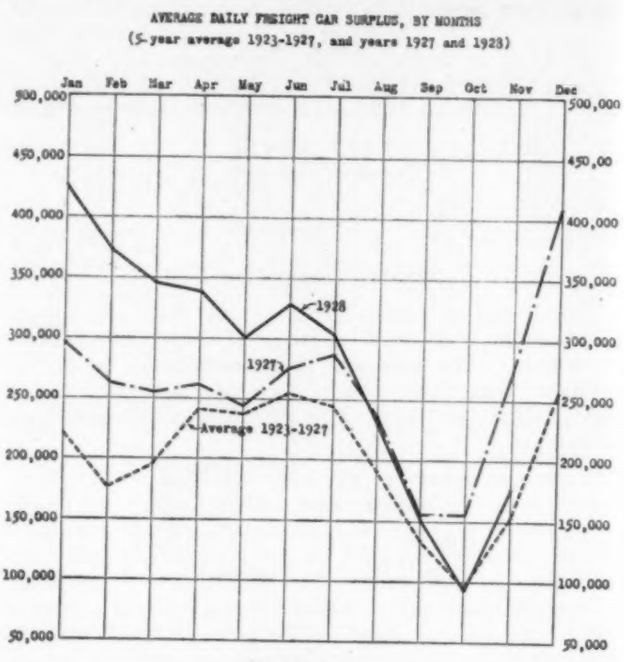


Chart D

was 454 cars; the next largest were 279 and 237; all others fell below 150. In 40 of the 45 periods there were either no shortages or they were merely nominal, running less than 100 cars.

The average shortage reported for the year 1928 was 45 cars, compared with averages of 169 cars in 1927, 286 cars in 1926, and 443 cars in 1925. An average shortage of only 45 freight cars, when compared with the 2,300,000 cars daily passing between carrier and shipper, is so small a figure that it may be considered equivalent to zero. If this record can be continued, the country can feel that the old bugbear of industry—car shortages, or an unfilled demand for transportation—has become as extinct as the dodo.

Condition of Equipment

Statistics of reserve equipment, and of the absence of car shortage, may be considered in relation to the physical condition of the equipment actually at work. Stored locomotives and surplus freight cars are in good condition for service. Statistics of serviceable locomotives and cars therefore include stored and reserve equipment as well as that which is in active service.

Chart E outlines the proportion of equipment reported serviceable each month. The lower half of the chart presents a curve showing the percentage of locomotives in serviceable condition during 1928, compared with 1927 and the five-year average. The upper half presents a similar curve for freight cars. In the case of locomotives the curve for 1928 ran generally above that for 1927, and considerably above the five-year average. Freight car condition averaged slightly below that of 1927, although well above the five years.

These charts are drawn on the basis of reports compiled by the Car Service Division. Statistics compiled monthly by the Interstate Commerce Commission tell

a similar story. During each of the ten months from February to November, the percentage of serviceable locomotives was higher than in the corresponding months of any of the past seven years. Freight car

PERCENTAGE OF FREIGHT CARS IN SERVICEABLE CONDITION, BY MONTHS AND PERCENTAGE OF LOCOMOTIVES IN SERVICEABLE CONDITION ON FIRST OF EACH MONTH
(5-year average 1923-1927, and years 1927 and 1928)

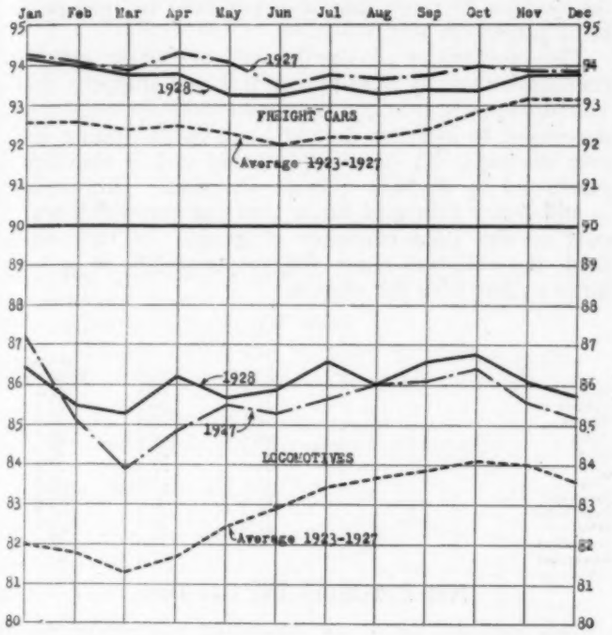


Chart E

serviceability failed to make so good a showing, falling just below the high points of 1927, although improvement was made over all other preceding years.

Freight Car Movement

We have seen that railway equipment was in generally good condition in 1928, that the potential reserve was more than adequate, and that car shortages virtually did not exist. We may next consider how effective was the utilization of equipment. Table XII presents statistics as to the average number of miles per freight car per day, covering each month of 1928, 1927, and the five-year average.

Average daily car movement was higher in eight of the months of 1928 than during the corresponding months of 1927. Seven months equalled or surpassed an average of thirty miles per day, a record level of 36.2 miles being reached in October. The average for 1928 (ten months) surpassed thirty miles, the average of 31.2 miles being one-half mile above the previous year. Again the 30-mile goal set by the railways as their program in 1923 was realized. Compared with the five-year average, the returns for 1928 were higher in every month.

Table XII

MILES PER FREIGHT CAR PER DAY, BY MONTHS

	1928	1927	Average 1923-1927
January	27.6	28.5	26.7
February	29.8	30.4	27.6
March	31.0	30.9	28.2
April	29.9	29.5	27.7
May	31.2	30.2	28.4
June	30.4	30.0	28.2
July	30.4	29.1	28.2
August	32.1	30.9	29.4
September	33.9	32.6	30.9
October	36.2	34.7	32.5
November		30.2	30.2
December		26.9	27.1

Chart F graphically indicates the improvement in 1928 with respect to average daily movement of freight cars. All the later months of the year show consistent gain over 1927, and every month marks an advance over the five-year average.

Average freight car movement, as portrayed in Table XII and Chart F, is computed by dividing the total number of freight car-miles by the total number of freight cars, including idle or surplus cars, cars in or awaiting shop, and cars in the hands of shippers for loading and unloading. Such an average does not indicate the movement of freight cars while actually in motion, but merely represents the average number of miles made each calendar day in the year by all cars in the railway service on that day. It is not an accurate statement of actual movement.

When in a train and in motion, a freight car travels at the same speed as the train. Average freight train speed is also the speed at which the average freight car moves while under way. Freight train speed broke all

MILES PER FREIGHT CAR PER DAY, BY MONTHS
(5-year average 1923-1927, and years 1927 and 1928)

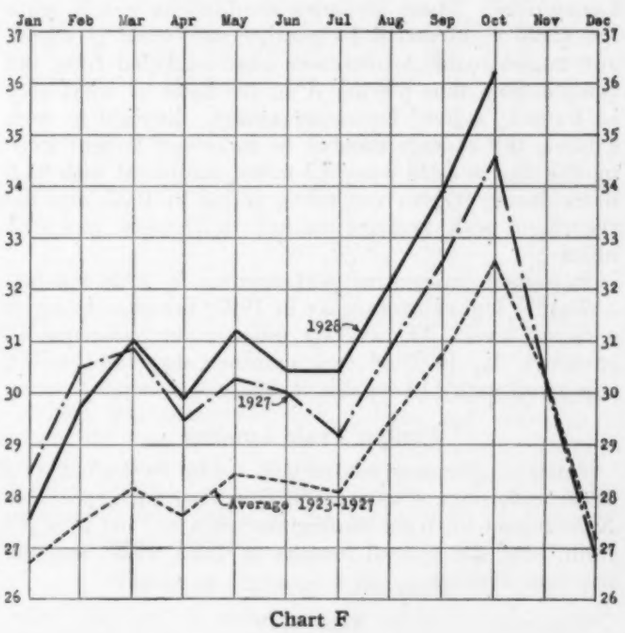


Chart F

records in 1928, attaining in the first ten months an average of 12.8 miles per hour. This was half a mile faster than in 1927, and represented a gain in this important efficiency factor of four per cent.

The total movement of a moving freight car in a day may be computed by multiplying the 12.8 miles of speed per hour by 24, which gives a result of 307.2 miles. Any freight car that was continuously in motion during any period of 24 successive hours thus travelled more than 300 miles in that day. This is a somewhat different picture from what is gained when we say that the average daily movement of all freight cars—including those at rest and in shop—was 31 miles per day.

Locomotive Movement

Another phase of railway movement deals with the effective handling of locomotives. This is another significant factor of railway efficiency.

Table XIII presents statistics of miles per freight locomotive day, by months for 1928, 1927, and the

five-year average. The average for 1928 (ten months) was 61.3 miles, compared with 61.3 miles in 1927. A glance at the table will indicate that five of the ten months to November 1 showed improvement over 1927, but that the situation grew better as the year wore on, with the best results in October. The average reported for that month—69.9 miles per day—was greater than in any one single month in preceding years.

Table XIII

LOCOMOTIVE-MILES PER FREIGHT LOCOMOTIVE DAY, BY MONTHS

	1928	1927	Average 1923-1927
January	57.6	61.0	59.1
February	59.7	62.1	59.9
March	60.5	61.8	58.9
April	58.2	59.3	57.1
May	60.2	59.8	57.1
June	59.3	59.4	57.0
July	59.6	57.8	56.8
August	62.6	61.0	58.8
September	65.5	64.2	62.0
October	69.9	66.9	64.9
November		60.5	61.6
December		57.3	58.2

As in the case of freight car movement, the statistics of locomotive-miles per freight locomotive day in Table XIII were computed on a basis that included locomotives in or awaiting shop, and stored or surplus locomotives. These statistics would more nearly state the facts as to actual locomotive movement if stored and unserviceable locomotives were excluded from the computation, thus placing it on the basis of what may be termed "active" locomotives only. Revised to such a basis, the average number of miles per freight locomotive day in 1928 was 88.3 miles, compared with 85.8 miles during the corresponding period of 1927, and the record or peak average reached in October was 94.1 miles.

Passenger locomotive performance in 1928 reached a slightly higher average as in 1927, the year being at a record level. The average mileage per passenger locomotive day in 1928 (ten months) was 114.6 miles, compared with 114.4 miles in 1927.

Freight Train Loading

Another efficiency record was set by the railways in 1928, with respect to average freight train load. Table XIV deals with train loading statistics, or "net tons per train," for the several months of 1928, 1927, and the five-year average.

Table XIV

NET TONS PER TRAIN, BY MONTHS

	1928	1927	Average 1923-1927
January	748	748	707
February	759	772	721
March	776	785	729
April	759	754	719
May	785	787	748
June	785	785	750
July	796	781	754
August	823	813	785
September	843	819	781
October	843	805	777
November		754	749
December		718	706

The average load per freight train was greater in five months of 1928 than in the corresponding months of 1927, and the same in two months. Every month's return ran above the five-year average. The average trainload for 1928 (ten months) was 793 tons, which was eight tons above 1927. This result was achieved in spite of a decline in the movement of so heavy loading a commodity as coal. The later months of 1928 showed considerable improvement, which was undoubtedly affected by the partial comeback of coal as a traffic factor.

Freight cars per train numbered 48.2 cars in 1928 (ten months), compared with 46.7 cars in 1927.

Heavier Carloading

Average load per freight car declined in 1928, the average for ten months being 26.6 tons, compared with 27.2 tons in 1927. Table XV gives the figures by months, which indicates that every month in 1928 ran below the corresponding month of 1927. Here again, the decline of more than five per cent in coal movement played its part.

The problem of heavier loading of freight cars has been under survey both by carriers and shippers. Individual shippers in many cases have actively assisted the movement to increase the car load, by increasing their own loadings. A campaign to that end is also being conducted by the Car Service Division. The average is still below that goal of 30 tons per car which was a part of the 1923 efficiency program. In this whole field, the railways share the responsibility to a very large extent with the shippers.

Table XV

NET TONS PER LOADED CAR, BY MONTHS

	1928	1927	Average 1923-1927
January	27.2	28.4	28.1
February	26.6	28.0	27.6
March	26.1	27.4	26.9
April	25.6	26.2	26.3
May	26.3	26.9	27.0
June	26.3	27.0	27.2
July	26.6	27.0	27.4
August	27.2	27.6	27.8
September	26.7	27.1	27.1
October	27.0	26.5	26.9
November		26.8	27.4
December		27.1	27.6

Net Ton-Miles Per Car-Day

Still another factor of operating efficiency, which takes into account the load in the freight car and the speed at which the car moves, is the average net ton-miles per freight car-day. Table XVI presents this factor, by months, for 1928, 1927, and the five-year average.

The average was 525 ton-miles per car-day in 1928 (ten months), which was two miles under the corresponding average for 1927, but was steadily rising toward the end of the year. The last four of the ten months showed improvement, the average of 628 miles in October being a record for any one month.

Table XVI

NET TON-MILES PER CAR-DAY

	1928	1927	Average 1923-1927
January	470	501	481
February	496	530	497
March	514	537	495
April	482	492	473
May	512	516	493
June	502	512	491
July	509	493	490
August	549	538	525
September	587	568	549
October	628	586	573
November		497	524
December		448	466

Ton-Miles Per Train-Hour

Load and speed are combined in another factor of efficiency, namely, ton-miles per freight train-hour. In this case, the train is taken as the load unit, instead of the freight car. Table XVII presents statistics of net ton-miles per freight train-hour, by months, in 1928, 1927, and the five-year average.

As was true of 1927, it is again true in 1928, that every record was broken during the year. The record mark for a single month was set at 10,730 ton-miles in September; this compares with the previous record of 9,965 ton-miles per hour. The average for 1928 (ten months) was 10,189 ton-miles, compared with 9,650 in 1927. Again the average for each single month

of 1928 was greater than for the corresponding month of any previous year.

The primary reason for the achievement of 1928 in this field is that freight train speed, which is an important element in the factor of ton-miles per train-hour, maintained a record average of 12.8 miles in 1928 (ten months), while the train load also broke all records.

Table XVII

NET TON-MILES PER TRAIN-HOUR, BY MONTHS

	1928	1927	Average 1923-1927
January	9,476	8,904	7,960
February	9,677	9,310	8,128
March	9,913	9,571	8,348
April	9,821	9,296	8,443
May	10,272	9,838	8,941
June	10,280	9,835	8,969
July	10,462	9,882	9,043
August	10,502	9,950	9,219
September	10,730	9,965	9,117
October	10,630	9,954	9,016
November		9,418	8,718
December		9,020	8,264

Chart G shows the curve of net ton-miles per train-hour for each month of 1928, compared with 1927 and with the five-year average.

The performance of the railways in 1928 is emphasized by the chart, which shows a curve above that for

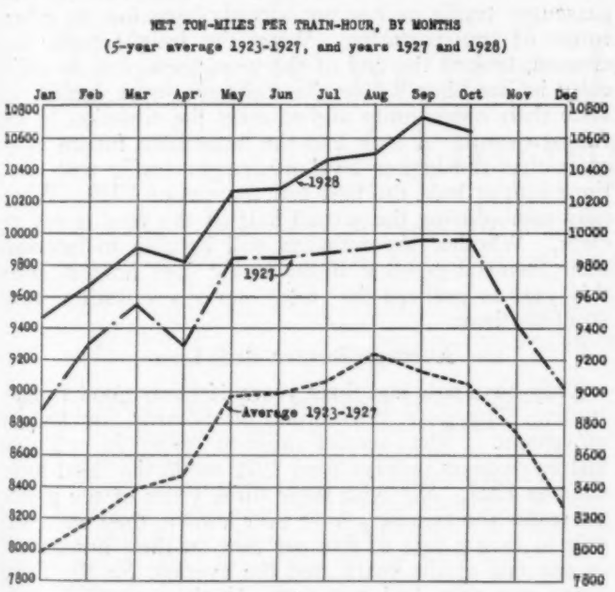


Chart G

1927 at all points, and considerably above the five-year average throughout the year.

Closely related to this measure of efficiency is the average number of gross ton-miles per train-hour. This includes the weight of the freight car, as well as the weight of the load. As in the case of net ton-miles, gross ton-miles per train-hour broke every record in 1928—for each month, for any one single month, and for the year as a whole. The average for 1928 (ten months) was 23,623 gross ton-miles per train-hour, compared with 22,013 ton-miles in 1927.

Fuel Conservation

Another group of efficiency factors in which new records were set in 1928 are those of fuel consumption by locomotives. Table XVIII presents the average consumption of fuel in freight service, in pounds of fuel per 1,000 gross ton-miles, for each month of 1928, 1927, and the five-year period.

Every month in 1928 reported the lowest consumption on record. The average for 1928 (ten months) was 125 pounds per 1,000 gross ton-miles, compared with 129 pounds in 1927. The low figure of 115 pounds per 1,000 gross ton-miles reported for July and August was a better record than in any single month in preceding years.

Table XVIII

POUNDS OF FUEL PER 1,000 GROSS TON-MILES (INCLUDING LOCOMOTIVE AND TENDER), BY MONTHS

	1928	1927	Average 1923-1927
January	145	153	167
February	140	142	162
March	134	136	154
April	131	132	145
May	121	125	136
June	118	121	130
July	115	118	128
August	115	118	128
September	118	119	130
October	122	124	136
November		135	147
December		148	157

Statistics covering locomotive fuel consumption in the passenger service are given in Table XIX.

As was true of the freight service, locomotive fuel consumption in the passenger service was as low or lower in every month of 1928 than in any preceding year. An average of 14.9 pounds of fuel were consumed per passenger train car-mile in 1928 (ten months), compared with 15.2 pounds in 1927. The low record for a single month was set in July, 1928, with an average of 13.6 pounds per car-mile.

Table XIX

POUNDS OF FUEL PER PASSENGER TRAIN-CAR-MILE, BY MONTHS

	1928	1927	Average 1923-1927
January	16.9	17.4	18.7
February	16.5	16.8	18.5
March	15.8	16.3	17.8
April	15.3	15.6	16.7
May	14.5	15.0	15.9
June	13.9	14.4	15.2
July	13.6	14.0	14.9
August	13.8	14.1	14.9
September	14.2	14.2	15.2
October	14.6	14.9	15.9
November		15.6	16.7
December		16.6	17.3

Thus it appears that the limits of fuel conservation in freight and passenger service have not yet been reached, although it must also be true that those limits are being approached. Some individual railways can still improve their consumption record, and whatever improvement they make in the future will of course help the general average.

Index of Railway Efficiency

Many factors of efficiency in railway operation reached high levels in 1928. Some of them set records for individual months or for the year as a whole. Others fell slightly below 1927, yet were close to previous records in their respective fields. At least nine factors of efficiency, in freight and passenger service, broke the record in 1928; most of these have already been discussed.

The problem is to bring the various factors together into a single index, so as to measure the progressive improvement of the railways toward a higher level of performance. One method of approach has been utilized, by which each efficiency factor is related on a percentage basis to its own previous level, then to combine all the indexes so computed for each factor into a common index.

Chart H is the result of such a computation. It combines the index numbers of thirteen efficiency factors, for each of which a separate index has been found, using the average of the five years from 1920 to 1924 as a base, or 100 per cent. The average of the thirteen indexes is taken as the general index of railway effi-

ciency. This index is shown for each year from 1920 to 1928.

Chart H has two outstanding features. First, following a decline in 1921, every year since that date has shown improvement over the next preceding year. This progress was especially marked in 1923, in 1925 and 1926, and in 1928. Second, the index for 1928 is higher than in any previous year, the average being 17.7 per cent above the base period average (1920 to 1924).

The yearly averages for the five years from 1924 to 1928 are as follows: 1924, 104.8; 1925, 109.4; 1926, 113.5; 1927, 115.2; 1928, 117.7. Thus the five years

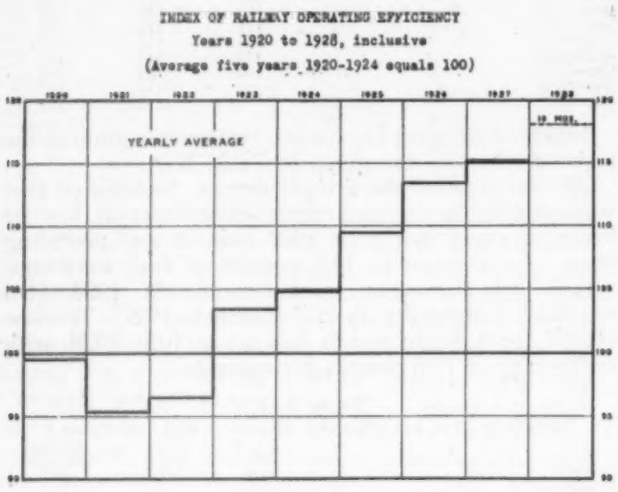

INDEX OF RAILWAY OPERATING EFFICIENCY
Years 1920 to 1928, inclusive
(Average five years 1920-1924 equals 100)
YEARLY AVERAGE

Chart H

showed progressive improvement over the base of approximately five, ten, thirteen, fifteen, and eighteen per cent, respectively.

Factors in the Index

The thirteen factors combined to form this index of railway efficiency are given below.

1. Car-miles per car-day.
2. Ton-miles per car-day.
3. Gross tons per train.
4. Net tons per train.
5. Gross ton-miles per train-hour.
6. Net ton-miles per train-hour.
7. Locomotive-miles per locomotive-day. (Freight).
8. Locomotive-miles per locomotive-day (Passenger).
9. Percentage serviceable locomotives. (Freight).
10. Percentage serviceable locomotives. (Passenger).
11. Percentage serviceable freight cars.
12. Fuel consumption per unit. (Freight).
13. Fuel consumption per unit. (Passenger).

These thirteen factors of railway performance include averages for both the freight and passenger service. They supply measures of various elements of efficiency, such as speed, loading, car handling, condition of equipment, and fuel utilization. The index is submitted as a reasonably accurate, even if not a perfect, measure of the effectiveness of railway operation during recent years.

Railway Employees

The average number of railway employees in 1928 was 1,670,000, compared with 1,760,999 in 1927. This was a reduction of about five per cent.

Aggregate compensation paid to employees in 1928 was less than in 1927, the comparative figures being $2,840,000,000 in 1928 and $2,953,211,375 in 1927. This was a decrease of about four per cent, compared with the reduction of five per cent in number of employees.

Average compensation per employee was higher in 1928 than in 1927, a progressive increase in annual employee compensation having occurred each year since 1924.

The average for 1928 was approximately $1,700 per employee. The corresponding average for 1927 was $1,677, while that for 1926 was $1,656.

Had employees received the same average compensation in 1928 as in 1927, the total payroll of the railways would have been approximately $40,000,000 less than it was.

Conclusion

This analysis of the many interwoven factors of railway operation in 1928 including those that deal with traffic, revenues and expenses, the human element as indicated by the position of the employees, and many others clearly marks the year 1928 as a period of well defined characteristics. There was the drive toward greater efficiency, which for the most part attained its goal.

There was a continuation of that prompt and adequate service which has come to be recognized as a permanent feature of railway operation in the United States. There was the struggle to retain such of the passenger traffic as has not already been lost to other forms of transportation. When the freight traffic increased, toward the end of the year, there was no difficulty in handling it, for the railways were quick to seize their opportunity and to meet the situation to its fullest extent. A look into the immediate future indicates that the higher level of freight traffic will continue into at least the first few months of 1929. What may come during the second half of the year is not so clear. Whether the railways will be able to improve their financial position if the traffic does hold its own this year is perhaps the most serious question confronting them.

Average Return Still Low

They have now had three years of fairly good freight traffic. The year 1926 broke all records for freight movement. The second highest year in railroad history appears to have been 1928 while the third largest was 1927. Yet with these three years of the greatest traffic the railroads have ever known, they were unable to earn a rate of five per cent on their investment in any one of the years, and the average for the three years was only 4.63 per cent. In the meantime, railway wages have shown a steady upward trend, and the freight rate levels have if anything been tending downward.

The roads have maintained their net income only by increasing the economy and efficiency of their operations to the greatest possible extent. It is manifest that such a process cannot continue indefinitely. Their passenger revenue is still declining. Their freight revenue cannot always maintain its present levels. They cannot indefinitely introduce savings into their operations, through fuel conservation, elimination of waste, and other similar factors. They cannot indefinitely meet the rising tide of wages and taxes. In the large, the railway problem involves adjustment of rate levels to operating expenses and fixed charges, such as will produce the greatest possible return, the price of the service to the public being of course fixed at a reasonable level. This is a real problem, and calls for the application of the broadest principles of economics and of sound public policy. It demands the best thought of every class of citizens in the United States, including not only railway officers, but all the rest of us.

Northern Pacific Single-expansion Articulated Locomotive, Built by American Locomotive Company—Tractive Force, 153,300 lb.

Trends in the Equipment Field During 1928

Records broken for locomotive size—Notable changes from the conventional in car construction

By C. B. Peck
Mechanical Department Editor, *Railway Age*

DURING the past five years motive power developments have been characterized by an increasingly intensive utilization of the possibilities of well-established wheel arrangements, with the substitution in many cases of a four-wheel for a two-wheel trailing truck, for the development of the utmost power output with the minimum increase in size and total weights. It has been a period during which few records of size have been broken. The outstanding event in the motive power field during the past year has been the building of an articulated locomotive for the Northern Pacific which has broken several records. With the exception of the Erie Triplex locomotive which was built in 1914 and the Virginian Triplex locomotive built in 1916, it has the greatest weight on drivers of any locomotive so far built in America. These two Triplex locomotives, however, are exceptions only because of the third engine unit under their tenders.

In combined weight of locomotive and tender, the Northern Pacific locomotive has passed the million pound mark. Including the booster, its tractive force rating is 153,300 lb., which has only been exceeded by the two Triplex locomotives. In combined heating surface it exceeds any locomotive built without exception, the combined heating surface being 10,892 sq. ft. The Virginia Triplex had 10,725 sq. ft. In the matter of grate area, this locomotive is even more striking, having a grate of 182 sq. ft., fed by a stoker designed to deliver a maximum of 20 tons of coal an hour. It must be remembered that this locomotive is designed to burn a lignite of relatively low heating value. The maximum evaporating capacity of the boiler is expected to reach 120,000 lb., or about 14,400 gallons of water an hour. On the whole this locomotive represents a bold step forward in the attempt to increase locomotive capacity by an increase in dimensions well beyond those which, even in recent years, were considered the ultimate.

The ultimate in the development of locomotive capacity was believed to have been reached as much as 20 years ago, and the possibilities for future increases have been considered doubtful at numerous times since. In an interview in the New York Times of March 10, 1907, no less a person than E. H. Harriman was quoted as follows: "Did you ever ride in the cab of one of the modern freight locomotives? Well, you probably noticed the swaying back and forth that accompanied the drive of the pistons. That meant that the center of gravity had crept up about as high as it could go without having the engine topple over when it got into action. It told you that we had gone as far as we could in building engines up into the air. Now if you will think a minute you will see that there is obviously a limit in length of firebox beyond which it is impossible to fire an engine. And we have reached that limit as well. So there you are. If we increase our car capacity, we increase the unproductive dead weight that is to be drawn disproportionately to the increase of the load, and in so doing we are making demands upon tractive power that has already reached the limit of its development under present conditions. The obvious relief, then, would be

by widening the gage to six feet, and I am not sure that the railroads will not come to that in the end."

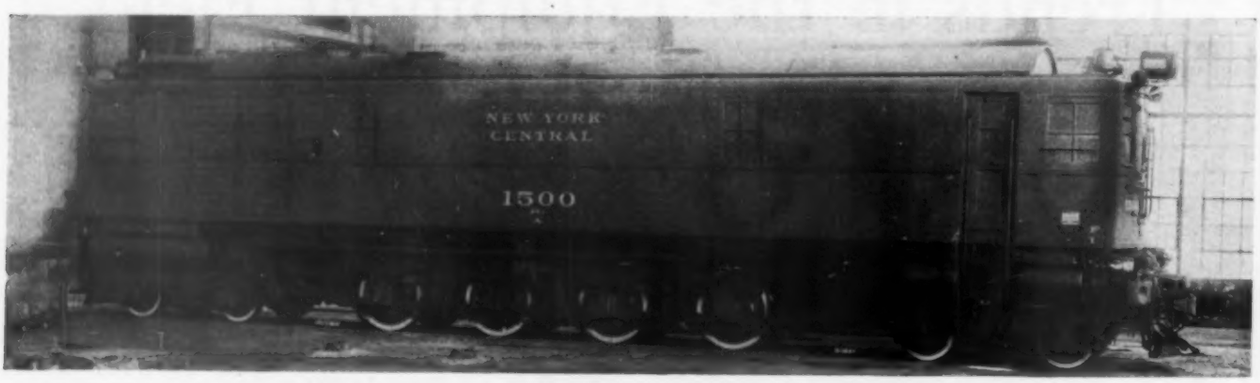
The stoker removed the limitations on the length of the firebox referred to by Mr. Harriman. The measure of success with which the stoker distributes coal over a grate 19 ft. long in the Northern Pacific locomotive will determine whether, for the time being at least, we must consider something a little above 100 sq. ft. of grate area as the limit. The application of single-expansion cylinders to the articulated locomotive has removed the limitations on cylinder capacity which the size of low-pressure cylinders placed on the capacity of Mallets.

At the present time the ultimate capacity of the locomotive would seem to depend more upon the limitations of pulling and buffing forces which the present type of freight car construction will withstand, than upon conditions inherent in the locomotive itself.

Increasing Boiler Capacity

The past year has seen relatively little activity in the locomotive market. The tendency in such locomotives as have been built, however, has been to take advantage of every facility which has been developed to increase the amount of boiler capacity which it is possible to obtain with a given weight on drivers.

A notable example of this tendency may be seen in the new 4-8-4 type locomotives recently built by the Canadian Pacific at its Angus shops. It will be remembered that in 1927 this road first made use of nickel steel in the barrel sheets of an order of Pacific and Mikado type locomotives, and that by this means it was possible to increase the boiler pressure from 200 lb. to 250 lb. per sq. in., with no increase in weight. In the 4-8-4 type locomotives the use of nickel steel has been extended to the firebox sheets, the tube sheets, staybolts and the arch tubes, and carbon steel has completely replaced iron in such details as tubes, braces and rivets. This again permitted an increase in boiler pressure to 275 lb., with no greater weight than would have been required under the practice of two years ago in a boiler for 250 lb. pressure.



A 174-Ton Diesel-Electric Passenger Locomotive with McIntosh & Seymour Engine

Other Locomotive Trends

In addition to the several orders of new locomotives of the single-expansion articulated type which have been built during the past year, several railroads have been converting Mallet compound locomotives into the single-expansion articulated type, thus producing locomotives more suitable for road service. The problems created by the necessity of conveying high pressure steam through flexible pipes to the front cylinders have resulted in several different steam pipe designs.

The use of boosters or auxiliary locomotives is increasing, partially, no doubt, because of the increased ability of the boilers to care for the steam demand.

In the field of structural design the extension of the use of the locomotive bed casting is the outstanding feature. This bed casting, which combines in a single unit the frames and crossties, is being used in a constantly growing number of new locomotives. During the past year it has been incorporated in parts of several orders for locomotives of previous designs and, in several instances, the bed castings have included the cylinders.

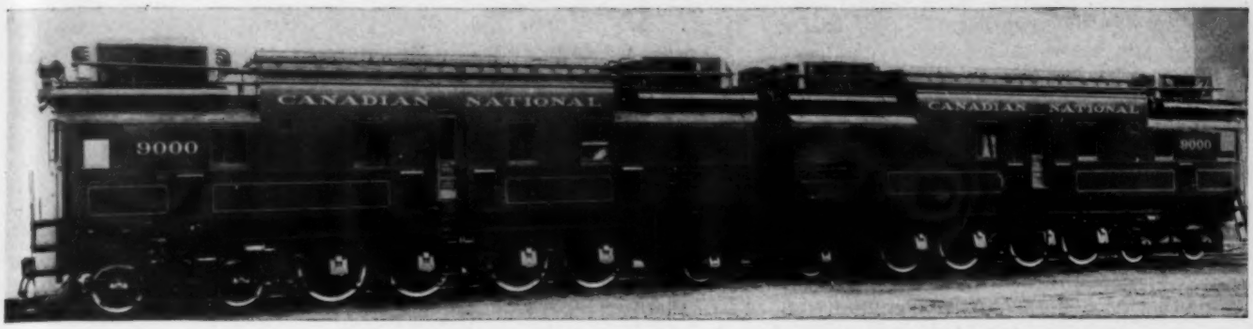
The use of special types of driving boxes on the main journals is also being extended in replacement of the long-established crown-bearing type.

The growing interest being shown by designers in the problems of counterbalancing indicates that this will be one of the next details to come in for improvement. The increasing weights of the reciprocating parts required to transmit the large driving forces produced by high steam pressures and large cylinders in two-cylinder, single-expansion locomotives has increased the difficulty of securing satisfactory counterbalancing. Unless better methods can be developed, counterbalancing conditions may soon be recognized as the condition limiting the capacity of this type of locomotive. The inability to put sufficient counterbalanced weight into wheels of small diameter is tending to increase the diameter of driving wheels and the length of the piston stroke of freight locomotives.

The year has seen little activity in extending the use of watertube fireboxes. The outstanding locomotive embodying this type of construction to be built during the year was the President Cleveland of the Baltimore & Ohio, which was on exhibition during the conventions of the Mechanical and Purchases and Stores Divisions at Atlantic City in June. The inclusion on this locomotive of the Caprotti valve gear also marked the greatest change in the type of valves and the method of driving them which has taken place in America since the advent of the outside-driven Walschaert valve gear as a substitute for the inside-connected Stephenson gear.

The drafting of locomotives is a problem which has never satisfactorily been solved. Much work has been done at various times in an effort to develop rules or proportions which could be generally applied. So far, however, the usefulness of rules so developed has been confined within relatively small limits of variation in the proportions of the locomotive. This problem is again receiving a large amount of attention.

The underlying principles controlling the action and proportions of the locomotive front-end as a gas ejector, however, do not seem yet to have been dis-



The Canadian National 2,660-hp. Diesel-Electric Locomotive—Starting Tractive Force, 100,000 Lb.

covered, at least in such form that they may be applied to the drafting of any locomotive with assurance that the most efficient results may be obtained without an undue amount of experimental work in effecting correct adjustments in each case. Science has not yet completely removed this problem from the realm of darkness.

One of the results of the long locomotive runs which have now become established practice in both freight and passenger service is the growing use of tenders of large capacity. Attention has been called to this trend in previous years, and it still continues. New tenders with less than 20,000 to 21,000 gallons water capacity are now becoming the exception, rather than the rule, especially for freight power.

The long locomotive run has also created a number of lubrication problems which are being attacked in a variety of ways on different railroads. This applies particularly to the lubrication of engine truck boxes and, to a lesser extent, to crank pins.

The Diesel Locomotive

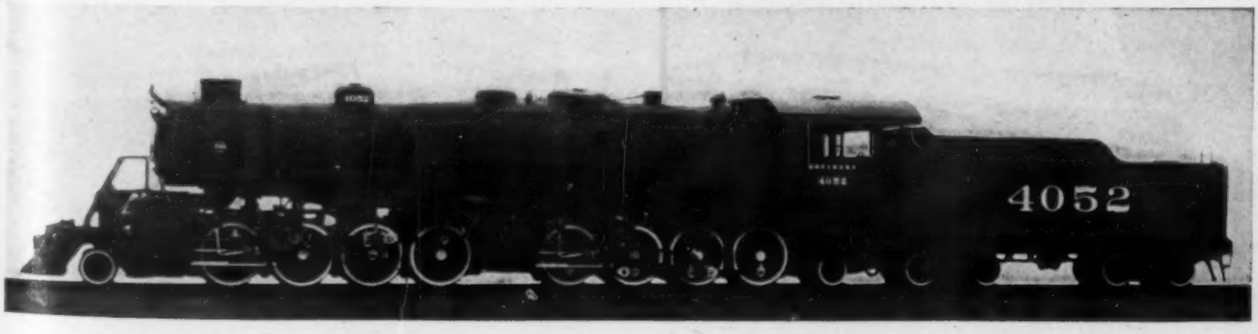
The Diesel-electric locomotive during the past few years has demonstrated its peculiar suitability for switching service. There are now more than thirty of these locomotives in such service. The past year has seen their advent in regular road service. Two such locomotives have now been built for use in road service on the Putnam division of the New York Central—one in passenger, and the other in freight service.

The outstanding development in this field is the new 2,660 hp. Beardmore Diesel locomotive which has just been completed for the Canadian National. This is the first such locomotive to be placed in service in America which at all approaches in horsepower capacity the requirements for other than light branch-line operation. The experience with this locomotive for the next year or two will go far to indicate what the future possibilities in this direction are likely to be.

Developments in Car Construction

The past year has witnessed two developments in freight car construction, in both of which marked departures have been made from long-established practice. An underframe design has been applied to more than 2,000 cars during 1928, in which a complete separation is made between the draft and buffing function and the protection of car body and lading from momentum shocks. This opens up the possibilities for the utilization of the energy-absorption characteristics best suited to the protection of the lading and the car structure against shocks, quite independently of all considerations pertaining to slack action between the cars. On the other hand, the amount of slack action, and the energy absorption accompanying it, may be fixed at a point most suitable from the standpoint of controlling the movement of the train, without compromise to satisfy the requirements of shock absorption. While the application of this principle has so far been confined to freight cars, it possesses attractive possibilities for passenger cars where shocks which are common occurrences, even though of no consequence in their effect on the cars themselves, become exceedingly disagreeable in their effects on the human frame and temperament.

The other development in which a departure has been made from conventional lines is a tight-lock coupler which provides a rigid drawbar connection from the point of attachment on the underframe of one car to the point of attachment on the underframe of the adjoining car, without sacrificing interchangeability with present standard couplers. The tight-locking principle offers the possibility of reducing the wearing effects of slack on the parts of the coupler itself, of providing a resistance to the climbing tendency which causes telescoping in cases of severe shocks, and of removing one source of uncontrolled slack between cars. It provides a means for supporting and alining connectors for all wiring and conduits which may be required.



A Light Single-Expansion Articulated Locomotive Built by Baldwin—Weight on Drivers, 409,000 Lb.; Tractive Force, 96,000 Lb.

The tendency toward the use of cast steel to replace other materials used in locomotive construction has been commented on in these articles several times during the past few years. A beginning has been made in the same direction in the case of freight car construction, and 1928 has produced further evidence of this trend in the use of unit steel underframe castings in an order of ore cars placed in service by the Duluth, Missabe & Northern. While less striking, it is also evident in the hopper car, which was exhibited by the Wine Railway Appliance Company at Atlantic City last June, in which a number of structural parts commonly built up of plates and sections were replaced with steel casting. Aside from its other advantages, in a car handling material from which there are corrosive drippings the unit structures of cast steel are less effected by corrosion.

Status of Standard Cars

Much progress has been made in the study of the details of freight car design during recent years by the Car Construction Committee of the Mechanical Division, American Railway Association. This committee is making steady progress in the development of designs which are to become the standards of the association. The recent letter ballot on the propositions presented by this committee at the convention of the division at Atlantic City in June resulted in the acceptance of the general design of a steel-frame, double wood-sheathed automobile car for unrestricted interchange, which will have inside dimensions of 40 ft. 6 in. by 8 ft. 7¾ in. and 9 ft. 1⅝ in., and a similar car for restricted interchange which will be 9 ft. 2 in. wide by 10 ft. high inside, and will be designed in lengths of 40 ft. 6 in. and 50 ft. 6 in. The designs of both types will cover the use of both 10-ft. 6-in. and 12-ft. side door openings and will also permit of the use of end doors where these are considered desirable. While the propositions formally cover but two standard types, it will be seen that the latitude permitted in the designs covers a number of combinations which will really permit the construction of 12 different cars.

The proposed general designs of the 50- and 70-ton hopper cars were also accepted by the recent letter ballot and the development of the detail designs of these cars is now in the hands of the committee.

Another improvement of more than passing importance is the decision of the A. R. A., in the recent letter ballot, to discontinue as standard its detail side-frame designs and replace them in the Manual with diagrams prescribing axle spacing, clearances and other dimensions important with respect to interchangeability. This is a recognition of the need for much further improvement in truck design to meet the conditions imposed by high capacity cars, which should encourage initiative in attacking the problems in this field of development.

Refrigeration

The past year has seen the first practical step away from ice as the cooling medium for refrigerator cars. The use of silica gel, with illuminating gas as a source of heat, passed from the experimental stage during the year and is now employed in thirty refrigerator cars.

The initial steps have also been taken in the application of solid carbon dioxide—the so-called dry ice—as a substitute for water ice in refrigerator cars. The possibilities for this development were set forth in a paper read before the annual meeting of the American Society of Mechanical Engineers, an abstract of which appeared in the *Railway Age* of December 22, 1928. While this may ultimately become a commercially practicable application, it has not yet reached that stage.

Passenger Cars

While the passenger cars built during the past year have not shown any marked departures from customary practice which have not already appeared in previous years, it is evident that the tendency to pay close attention to esthetic considerations in interior decorations is becoming more general. This is accompanied by more consideration to elements of comfort and convenience for the coach passenger. More originality is also being shown in interior arrangements of cars for club service.

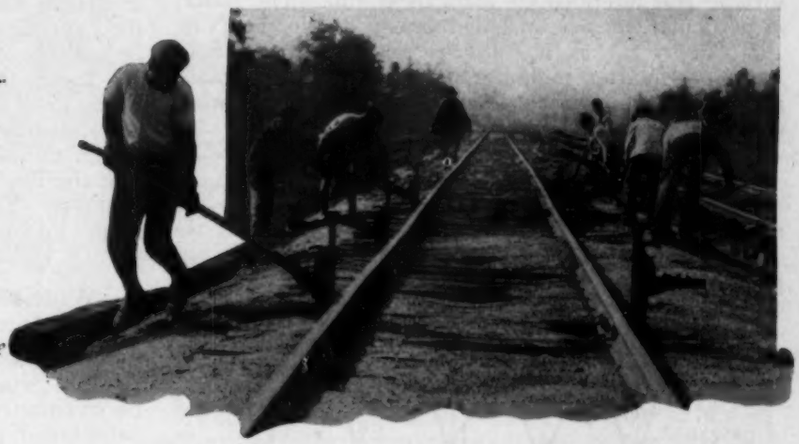
The roller bearing has established itself in the passenger car field, and its use is being rapidly extended.

A 50-ton Steel-sheathed Box Car Equipped with the Duryea Underframe in Which the Car Body Is Free to Move Longitudinally on the Center Sills Against a Cushion-Spring Device—Built by Standard Steel Car Company

Maintenance of Way Practices Show Improvement

Year was characterized by further progress in the establishment of improved methods rather than in spectacular achievement

By Walter S. Lacher
Western Engineering Editor, *Railway Age*



IF any group of railway maintenance officers were asked to single out the one development in roadway affairs during 1928 that possessed the greatest significance, it is reasonably certain that they would all reply that it was the practical perfection of the transverse fissure detector, for the general application of this ingenious device bids fair to effect a marked improvement in the safety of track. On the other hand, it is impossible to point to any index of further progress during 1928 in efforts to determine the cause of these concealed defects. The transverse fissure is definitely an international problem and the engineers and metallurgists of Europe appear to be no nearer the answer than those of North America.

Established Policies Continued in 1928

Taken as a whole, the record of 1928 in maintenance of way and structures represents a continuation of established policies for a progressive improvement of the physical condition of the fixed properties, which has been so evident during the course of the last five or six years. In spite of the achievements of previous years, there has been no sign of any let-up. It is possible, however, to point to certain deviations or modifications of the general trend during the last year or two.

Greater Attention to the Fixed Properties

Following the end of government operation, the railway managements entered into a program for improvements designed to overcome the general inadequacy of service with which the people of the United States were confronted at that time. It was realized, that some measure of relief could be effected, and that more promptly, by the purchase of more cars and the replacement of obsolete locomotives with modern power. But it was also realized that the greatest need was for additions and betterments to the fixed properties to permit the equipment to be utilized more fully, and beginning about 1923 capital expenditures were allocated in increasing proportion to the construction of additional tracks, yards, terminals and other new facilities, and the improvement of tracks and structures. So, while expenditures for such purposes represented only 36 per cent of the total capital outlay in 1923, they constituted 63 per cent of the total in 1927 and 67 per cent for the first nine months of 1928.

But what is more significant, from the standpoint of maintenance of way, is the evidence of the greater attention that is being given to the strengthening of the track structure in the railway improvement budgets during the last three or four years. This is to be seen in the following table of expenditures for heavier rail and for additional ballast. It will be noted that the expenditures for heavier rail have increased 64 per cent and the outlay for additional ballast 103 per cent during the last five years:

Year	Heavier Rail	Additional Ballast
1923	$27,866,000	$ 9,471,000
1924	32,037,000	10,824,000
1925	32,952,000	11,665,000
1926	42,184,000	16,520,000
1927	43,742,000	16,230,000
1928	43,500,000*	19,200,000*

* Estimated from reported expenditures for the first nine months of 1928.

110-lb. Section Most Popular in West

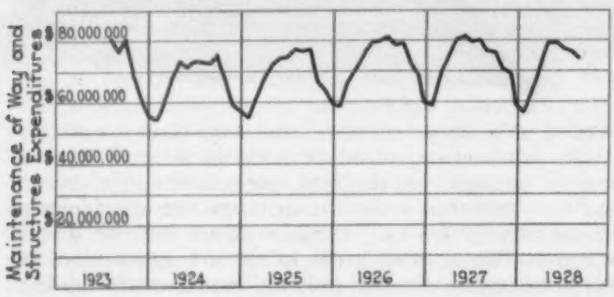
As is well known, the heavier sections of rail were employed first on the heavy-traffic lines of eastern railways; in fact, until about four years ago no railways west of Chicago were laying rails heavier than 100 lb. for other than certain special purposes. However, the tendency toward the use of heavier section is now rapidly becoming general among western roads. Exclusive of the lines of the New York Central System, which are laying the Dudley 105, 115 and 127-lb. sections, current tendencies in the transition to heavier rail sections follow two schools of thought. On the one side are those roads which have adopted the 130-lb. rail for their heavy-traffic lines or for curve track on important main lines. On the other are the roads that are making their rail purchases in a pattern of more conservative weight, and it is significant that at the present time the 110-lb. section is most popular among the roads represented in the second group. Thus we find that the 110-lb. section was adopted by the Santa Fe in 1924; the Nickel Plate, the Texas & Pacific, the Illinois Central and the Wabash in 1925; the Great Northern in 1926; the Rock Island and the North

Western in 1927; and the Frisco and the Pere Marquette in 1928.

While certain roads, such as the Southern Pacific, the Great Northern, and the Northern Pacific, have adopted the 130-lb. rail section as a means of meeting the problem of wear on curves, more recently attention has been directed to the possibilities of Sandberg sorbitic and intermediate manganese rail. The latter, in particular, may be included among developments of 1928, in so far as it concerns extended application. Fully one-quarter million tons of intermediate manganese steel rail was ordered by the railroads during the past year.

More Attention to Tie Plates

Owing to the fact that the increased life which the railroads are obtaining from cross ties is gradually reducing the annual requirements for renewals, it is impossible to draw any conclusions with respect to the current average tie condition from statistics covering



Expenditures of Class I Railways for Maintenance of Way and Structures, by Months

tie purchases. This is particularly true because of the wide divergence in the renewal requirements of individual roads. At least another decade must pass before most of the railroads can expect to enjoy benefits from practices designed to conserve ties to a degree commensurate with those obtained by those roads that have followed a more forehanded policy with respect to tie preservation.

Labor More Efficient

Of the expenditure for maintenance of way and structures during the first eight months of 1928, $300,226,438, or 53.3 per cent, was paid out in compensation to employees and officers of the department, as compared with $316,420,685, or 54.0 per cent in the corresponding period of 1927. These percentages compare with 54.1 per cent for the year 1923, thus indicating that the relationship between expenditures for material and labor has been subject to but little modification. While it is impossible to demonstrate by statistics, covering the railroads as a whole, that any appreciable advance has been made in the efficiency of railway maintenance labor, or that economies have been effected through the use of labor-saving equipment or improved methods, it is generally conceded that such advance has been made. Furthermore, it has been clearly demonstrated by cost studies of the operations of individual roads.

There are many reasons why this should be so. One influence has been the fact that labor has been more plentiful. The most pronounced manifestation of this is found in the rural communities, because of the decline in the demand for farm labor. Railroads, in most parts of the country, have had no difficulty during the last year in recruiting section hands from among the residents of local communities. As a consequence, the roads have been able to exercise a much greater degree of choice in the recruiting of maintenance of way labor than was the case during the war and the two or three years immediately following.

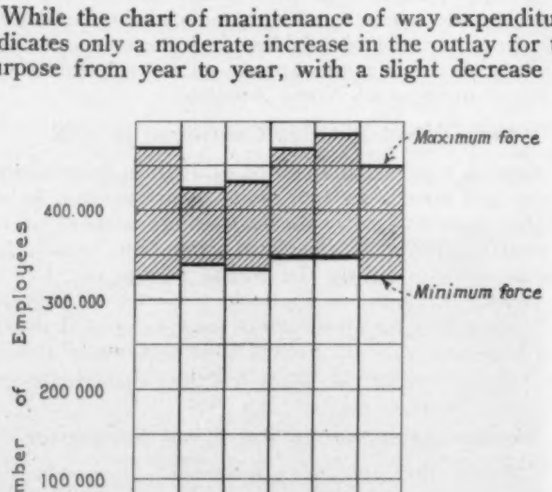
It has been the contention of many maintenance of way officers, that the efficiency of the department could be greatly improved by a more uniform distribution of the expenditures throughout the year, so that it would be possible to employ a larger proportion of the working force on a permanent year-round basis. A few roads have done much along this line, but a study of the statistics on maintenance of way employment from month to month for the last six years fails to indicate that the roads, as a whole, have made any appreciable progress. This is clearly shown in the chart of maximum and minimum monthly forces for the years 1923 to 1928 inclusive.

Wide Fluctuation in Monthly Expenditures

The same fact is illustrated in the chart of maintenance of way expenditures by months from August, 1923, to September, 1928. The range there shown may be summarized in the table below, which gives the expenditures for successive minimum and maximum months in sequence since August, 1923:

	Maintenance of Way Expenditures	Decrease from Previous Summer
August, 1923	$80,836,000	
February, 1924	54,519,000	$26,317,000
October, 1924	75,376,000	
February, 1925	54,923,000	20,453,000
August, 1925	77,487,000	
January, 1926	58,783,000	18,704,000
August, 1926	81,181,000	
February, 1927	58,669,000	22,512,000
June, 1927	81,637,000	
February, 1928	56,359,000	25,278,000
July, 1928	79,369,000	

While the chart of maintenance of way expenditures indicates only a moderate increase in the outlay for this purpose from year to year, with a slight decrease for



Range of Employment in Maintenance of Way and Structures, Class I Railways

1928 as compared with 1927, it is significant that maintenance of way expenditures are absorbing an increasing proportion of total operating expenses from year to year, in exactly the same way that additions and betterments to the fixed property make up an increasing proportion of the total capital expenditure. Thus, the ratio of maintenance of way expenses to total operating expenses was 16.6 per cent in 1923, 17.6 per cent in 1924, 18 per cent in 1925, 18.5 per cent in 1926, and

18.9 per cent in 1927, with prospects of a moderate increase for 1928.

The magnitude of the maintenance ratio depends on so many factors that efforts to draw any definite conclusions from them must proceed with caution. However, it should be clear that heavy capital expenditures and the prosecution of a program for a higher maintenance standard, will be reflected in higher maintenance ratios, and the tendency indicated above is clearly an index of the country-wide policy for a higher standard of fixed property. Without doubt, it reflects also the effect of economies in transportation made possible by physical improvements of the property, whereby other items making up total operating expenses have been proportionately reduced.

A few properties, of course, have reached a stage in their programs for physical betterment of the tracks and structures where they are now reaping benefits from them in the form of decreased maintenance expenditures, or at least in their relation to total operating expenses or operating revenues. This has been the case with the Delaware, Lackawanna & Western, as shown by George G. Ray, chief engineer. However, not many roads have been in a position to prosecute a program for a heavy standard of track construction or a high state of maintenance for as many years as has the Lackawanna, and it is, therefore, to be expected that the railways, as a whole, will have to continue their programs for betterments and improved physical condition for some years before they can realize corresponding reductions in maintenance ratios.

New Developments in Labor-Saving Tools

The year 1928 saw further progress in the use of labor saving equipment, as well as the introduction of new devices and the further improvement of equipment already in use. Probably the most pronounced activity was the increased use of power equipment in laying rail. Concurrent improvement in the facilities designed for this purpose, were in the nature of greater flexibility of operation and adaptation to a wider usefulness. While practically no railways have actually equipped their bridge gangs with power hoisting equipment of a type suitable for use in wooden trestle deck renewals, a number of them are endeavoring to make their rail derricks available to bridge gangs when not employed on rail laying work.

Hoisting and material handling equipment is also being used more widely, particularly with caterpillar treads. Most popular among machines of this type are those with the convertible feature, permitting their use with a shovel dipper, a drag-line bucket, a grab-type bucket or simply with a hook for hoisting operations.

In power tamping, progress has been made along two distinct lines, namely, the development of more complete plants of larger capacity and the introduction of truck-mounted machines for general ballasting work. One railroad has expedited its ballasting work with pneumatic tampers by the installation of steel pipe equipped with standard air-hose couplings. This not only reduces the amount of air hose to be handled by the tamper operators, but permits of a wider range of operation from a single position of the compressors.

Power and Hand Tools Widely Used

The use of power hand-tools, incident to rail laying, has been extended to a greater number of railroads during the past year, and one road carried out an effective combination of power rail laying and surfacing, whereby the surfacing is completed not more than one day behind the placing of the new rail.

In weed poisoning, the introduction of a chemical in dry powdered form, the perfection of spraying equipment to insure greater accuracy of application, and the development of equipment for multiple-track work, are new developments. In weed burning, the current trend is in the direction of small units that may be readily propelled by track motor cars. Weed or grass mowers have also been improved with a view to obtaining a greater width of cut and to increase the ease of operation.

Rapid Improvement of Motor Cars

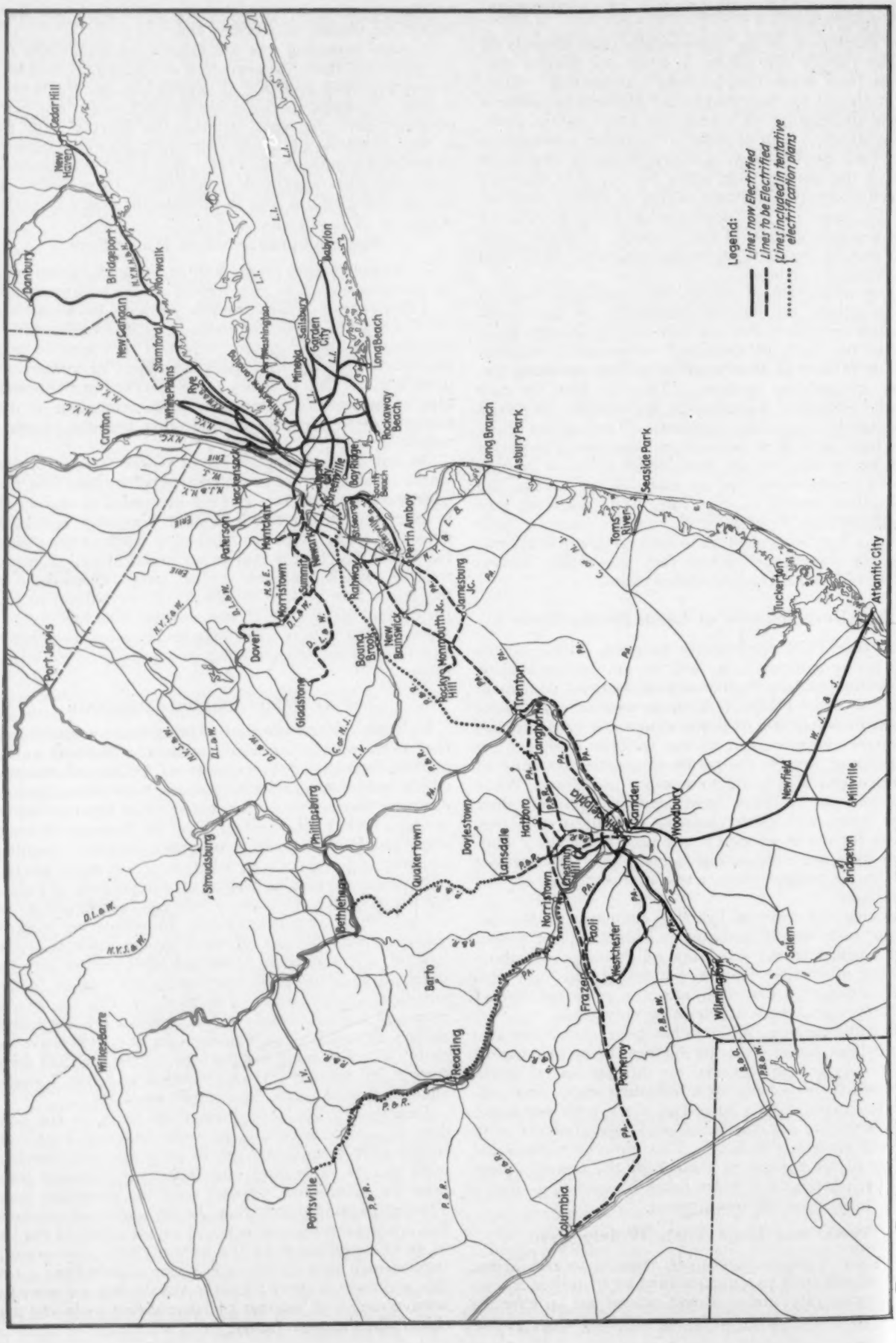
To review current progress in track motor cars would be as elaborate a task as to report on the improvements in automobiles. Yearly models seem to be almost as much a feature of the one industry as it is of the other. By the same token, greater reliability of operation and perfection of detail have been the object of attainment in each case. One tendency to be observed in the newer type of heavy-duty motor cars is the adaptation of the selective-speed transmission and other features of automobile practice.

As stated above, application of power tools to bridge work, other than the erection of steel bridges and the construction of concrete, has not proceeded as rapidly as in track maintenance. A modest beginning has been made in the use of power hand tools, such as the power hand saw, but this is still in an initial stage. Electric welding, which has been applied rather extensively to the fabrication of steel buildings, is now subject to experimental application in new bridge construction, but seems at this time to offer opportunities for more rapid expansion in the strengthening or repairing of old structures.

Reduce Water Station Attendance

In water service, progress is being made in the reduction of the number of water stations, coincident with a marked increase in the capacity of locomotive tenders, which makes it possible to operate locomotives greater distances between stops for water. This has resulted in savings, both in the reduction of the number of train stops and in the operation of water stations. Another tendency is toward the installation of automatic electrically-operated pumping plants, for the purpose of reducing the cost of attendance, which has been found to be a much more important factor in comparing electric operation with the use of other power units than the relation of power costs. These and other factors have resulted in an appreciable decrease in the cost of pumping-station attendance. Evidence of this is to be found in the reduction in the number of employees classed as pumping equipment operators, exclusive of those carried in other departments. Thus, in 1923 there were 6,247 men of this classification on Class 1 roads, while in August, 1928, the number was 4,541.

Progress in obtaining greater efficiency in the conduct of maintenance of way work has now been continued over a sufficient period of years that development in any succeeding year cannot of necessity comprise an outstanding advance over the preceding year. The significant thing is that the advance does continue. But when a comparison is made, for example, of the use of power equipment at the present with that prevailing a decade ago, the advance is seen to have been a real one, and there is every reason to anticipate a far more intensive use of all manner of labor-saving tools and machinery in the near future.



Eastern Portion of United States Showing Lines Now Electrically Operated and Those to Be Electrified. Tentative Plans Indicated Include Only Lines Covered by Definite Announcements

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Eastern Portion of United States Showing Lines Now Electrically Operated and Those to Be Electrified. Tentative Plans Indicated Include Only Lines Covered by Definite Announcements

Electric Traction Takes a Big Step

Electrified mileage of country will be increased 25 per cent upon completion of projects now authorized

By Alfred G. Oehler
Electrical Department Editor, *Railway Age*

THREE large electrification programs were announced in 1928 by the Pennsylvania, the Delaware, Lackawanna & Western and the Cleveland Union Terminals Company. A fourth program, announced by the Reading Company late in 1927, has been organized and details of the plan arranged.

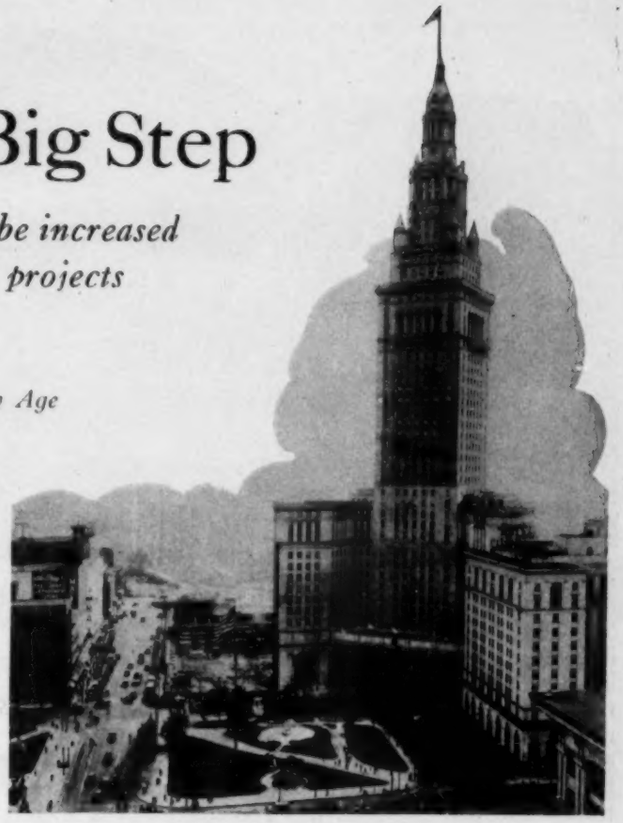
The combined Pennsylvania, Reading and Lackawanna projects will require an expenditure of about $135,000,000 and will include 442 route miles of railroad, a greater mileage than has been put in operation during the past eight years. Electrified mileage at the end of 1920 was 1449 and is now about 1850.

The Pennsylvania plans include the electrification of 325 route miles and 1300 miles of track and the purchase of 165 passenger locomotives, 200 freight locomotives and multiple-unit cars for 218 trains. This equipment will operate from an 11,000-volt, 25-cycle overhead trolley system. The work will require six or seven years for completion and will cost about $100,000,000. When completed, with the existing electrified connection over the New York Connecting Railroad with the New York, New Haven & Hartford, there will be unbroken electrified line from New Haven, Conn., through New York City and Philadelphia, Pa., to Columbia, Pa., a distance of 243 miles.

During the next three years the Reading Company plans to electrify a major portion of its lines in the metropolitan area of Philadelphia, including 49.9 route miles and 110 miles of track, at an expenditure of $20,000,000. This is announced as a first step in its electrification program which will probably be followed ultimately by extensions from Longhorne, N. J., to New York, from Jenkintown, Pa., to Bethlehem, Pa., and after completion of grade crossing elimination at Manayunk, Pa., through the Schuylkill valley to Reading, Pa., and Pottsville, Pa. This installation will also employ the 11,000-volt, 25-cycle distribution system. Multiple-unit cars only will be used for the initial step.

The electrification plans of the Delaware, Lackawanna & Western include 66.8 miles of its New Jersey suburban lines and will cost from $14,000,000 to $18,000,000 depending upon whether power is to be purchased or generated in a powerplant to be built by the railroad. The 3,000-volt direct current overhead trolley system will be used. This will be the first installation in which this system is applied to multiple-unit cars.

The Cleveland Union Terminal project, of which electrification is a part, has been under way for several years. It includes the construction of a new terminal building, 54 stories in height, which has now been completed with the exception of the lower portion which is to be occupied by the railroad station. The electrification involves 16 route miles, including the New York Central, Big Four and Nickel Plate lines. Twenty-five, 204-ton passenger locomotives are now being built for this installation. They will operate from a 3,000-volt direct current overhead trolley, and each locomotive will develop 3,000 hp., enabling it to move 1,275-ton trains over the electric zone at high schedule speeds.



New Cleveland Union Terminal Company's Building Which Will Include Railroad Station

Projects Completed

In July the New York, Westchester & Boston inaugurated service to Rye, N. Y., adding an increment of about two miles to its Westchester route. New terminal facilities have also been installed at Harlem River, N. Y.

Electric operation was started on the Boston, Revere Beach & Lynn on October 19. This is a double-track narrow gage line which extends from East Boston to Lynn, Mass., a distance of nine miles, with a branch line reaching the town of Winthrop, Mass. It carries about 15 million passengers annually. Locomotives were dispensed with and a part of the passenger coaches have been converted to motor cars. A 600-volt, direct-current, overhead contact system is used. The entire electrification work was completed in about six months' time.

About the same time the Pennsylvania completed the electrification of its line from Philadelphia, Pa., through Chester to Wilmington, Del. This includes 27½ miles of line and 100 miles of track. The 11,000-volt alternating current power is collected from an overhead contact system and service is provided with multiple-unit trains similar to those used on the other electrified lines of the Pennsylvania in Philadelphia suburban territory.

On December 4 the Great Northern inaugurated electric operation over 76 miles of its newly electrified territory from Wenatchee, Wash., to Skykomish, Wash.

Pennsylvania Train at Manhattan Transfer, New Jersey

The entire 80 miles of the Wenatchee-Skykomish line, including the four-mile section between Berne, Wash., and Cascade tunnel, will be operated by electric locomotives when the new tunnel is opened for traffic. The tunnel will be formally dedicated on January 12. Motor-generator type locomotives are used. Power is collected by pantographs from an 11,000-volt, alternating current trolley and converted on the locomotives by a motor-generator set to direct current for the traction motors.

Innovations

A battery-oil-electric locomotive was placed in switching service on the West Side New York City lines of the New York Central. This locomotive operates from power developed by an oil engine-driven generator with the battery supplying peak load requirements. The battery is charged in off-peak periods. The locomotive can also be operated from the battery alone or when in the electrified territory from the third rail.

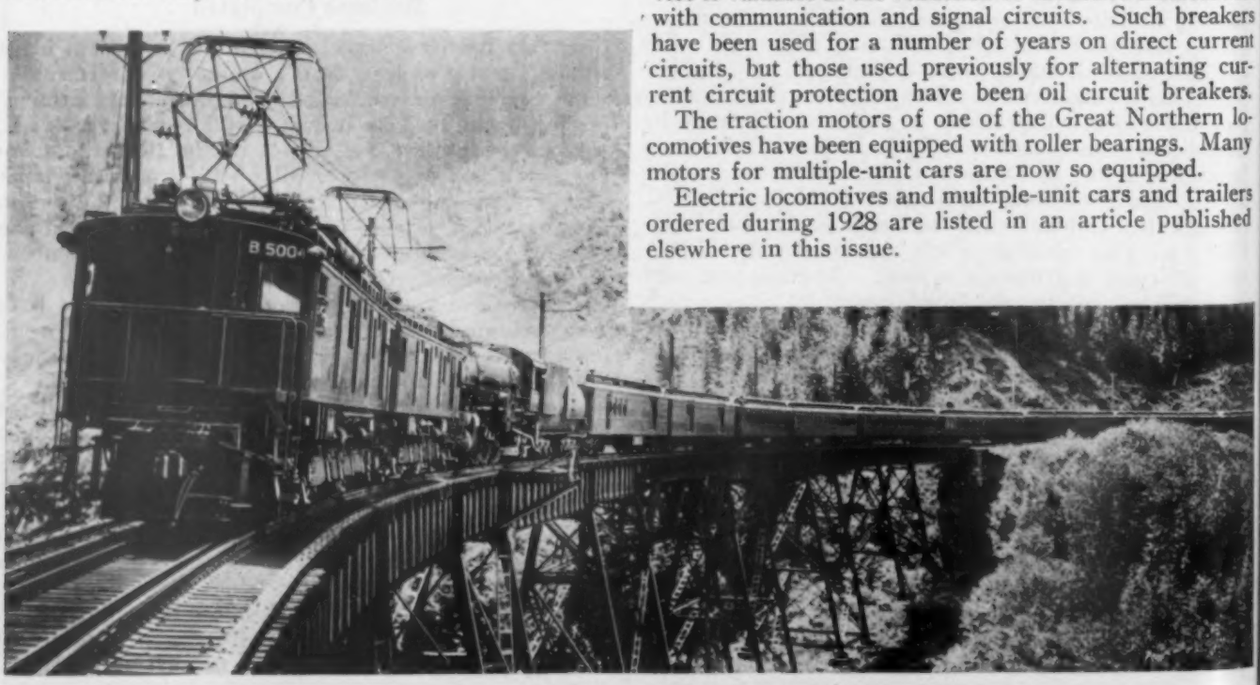
Two trolley-storage-battery-electric locomotives were placed in service on the Chicago & North Shore & Milwaukee for handling carload freight business. Each locomotive weighs 65 tons and can operate either from a 600-volt trolley or from a storage battery. The battery is charged by means of a motor-generator set when the locomotive is operating on track equipped with a trolley.

The Sacramento Northern placed two 68-ton locomotives in service which can operate from a 1200-volt trolley or a 600-volt third-rail or a 1,500-volt trolley. Interlocking devices on the locomotive prevent damage to apparatus when the locomotive moves from one power source to another.

High-speed, air-break circuit breakers for use on 12,000-volt, 1,500-ampere, single-phase feeders will be used by the Pennsylvania. The breaker is capable of opening a short circuit on 25 cycles in one-half cycle. Because of the high-speed of circuit interruption, this device is valuable in the reduction of inductive interference with communication and signal circuits. Such breakers have been used for a number of years on direct current circuits, but those used previously for alternating current circuit protection have been oil circuit breakers.

The traction motors of one of the Great Northern locomotives have been equipped with roller bearings. Many motors for multiple-unit cars are now so equipped.

Electric locomotives and multiple-unit cars and trailers ordered during 1928 are listed in an article published elsewhere in this issue.



Great Northern Train Including Steam Locomotive Being Hauled by a Motor-Generator Type Electric Locomotive

Running Time Has Been Cut on This and Hundreds of Other Through Trains

Service Improvements Show Record Progress During Year

Efforts intensified to hold and increase passenger and freight business during 1928

By Charles Layng
Transportation Editor, *Railway Age*

PRIOR to 1920, the attention of railway passenger officers was devoted principally to the consideration and adoption of methods for handling a constantly growing traffic. Since that date, these officers have become increasingly concerned with the problems brought about by a rapidly declining business.

From 1911 to 1920 the number of revenue passengers carried by Class I railroads hovered around the billion mark each year, and, while there was some fluctuation, the general trend was upward. The high mark was reached in 1920, when 1,234,862,048 revenue passengers were carried. Then the effects of motor competition began to make themselves felt and, while there was a slight upward movement in 1923, the other years have shown a rapid decline with the result that, in 1927, only 829,845,522 revenue passengers were carried, a decrease of 405,016,526 from the peak year of 1920. For the years 1924, 1925, 1926, and 1927, the number of revenue passengers carried was less than in any year between 1911 and 1923, inclusive.

The revenue passenger-miles also reflect the decline, having risen from 33,875,085,958 in 1913, to 46,848,667,987 in 1920 and then declined to 33,648,087,283 in 1927. In addition, the rates have suffered. If the average receipts per passenger mile received in 1921 had remained in effect until 1927, the railways would have earned $256,000,000 more during the last six years for the same amount of passenger business handled.

The comparative figures for the first eight months of 1928 are equally discouraging, for, during that period, the Class I railways carried only 521,952,000 passengers, as compared with 557,775,000 in the first eight months of 1927. Likewise, revenue passenger-miles declined to 21,377,046,000 in 1928 as compared with 22,854,068,000 in 1927, while passenger revenue was $608,043,791 in 1928 and $660,914,199 in 1927.

Confronted with this declining traffic and revenue, the railways are awakening to the necessity of making earnest efforts to regain or develop business, or at least to prevent further declines in passenger traffic and revenue. Considerable activity along these lines has, of course, marked each year since 1920, after the downward trend in passenger travel became evident. However, in 1928, far more was accomplished than in any previous year in the way of reducing schedules, providing more comfortable and even luxurious equipment for both Pullman and day-coach passengers, reducing rates and other measures for attracting traffic.

Reductions in Schedules

One of the advantages of railway travel for long hauls is the faster time that can be made, as compared with motor coaches. During the last year this advantage has been increased by a general reduction in

schedules on practically all of the passenger routes of importance. Between New York and Chicago, for example, the three principal passenger carriers have reduced the running time one hour on most of their principal trains, except the 20-hour trains. This reduction has been carried out, as well, between Detroit, Cleveland, St. Louis and New York, on practically all of the important through trains.

Important reductions have also been made in the Chicago-Pacific Coast service, and between points on the Pacific Coast. All of the eastbound extra-fare trains from San Francisco and Los Angeles to Chicago were placed on a 61 hr. 15 min. schedule, a reduction of 1 hr. 45 min., so as to make earlier connections with the eastern lines at Chicago. The schedule of these trains was reduced from 68 hr. to 63 hr. only a year or two ago. The time between Chicago and such north Pacific Coast Points as Portland, Ore., Seattle, Wash., and Tacoma, has likewise been reduced two hours, thus equalling the time made by all but the extra-fare trains between Chicago and California. A marked reduction has also been made in the schedules of trains operating between Portland, Ore., and San Francisco.

In a different direction, the time of practically all the important through trains from the north to Florida has been reduced, from an hour in one case, to 6 hr. 40 min. between Chicago and Tampa, Fla., in another instance. At the same time the running time of trains in Florida has been reduced, so as to save several hours on the steadily increasing traffic moving to Havana, Cuba.

In the northwest the day-train service between Chicago and Minneapolis, Minn., and St. Paul, has been improved by a reduction of over an hour in running time on all lines concerned, while the schedules between Chicago and Omaha on both night and day trains have been tightened, providing better connections at both points. In New England the Boston & Maine reduced the running time of 75 per cent of all its passenger trains on October 1.

These instances might be multiplied almost indefinitely. Reductions in running time have been general throughout the country and are indicative of an effort on the part of the railways to render better service and increase the advantage of faster time.

New Equipment Added

In addition to faster schedules, marked improvement has been effected during the year by the installation of much new passenger equipment. The trend towards comfortable and even luxurious furnishings and fittings has been marked. Here again, by reason of greater roominess, the train has an advantage over the motor coach or private automobile and it is to emphasize and increase this advantage that much of the new equipment is designed.

Among the outstanding features of some of these more commodious cars are such recent innovations in passenger-carrying equipment as glass-enclosed observation, sun-parlor cars, with windows specially designed to admit the ultra-violet rays of the sun. The equipment of the lounge cars includes soda water fountains and luncheonettes, electric cigar lighters at every seat; in fact, practically all the equipment of a well-organized club.

More attention is also now being paid to the decorative scheme of car interiors than ever before. A greater contrast between the present beautifully furnished and finished cars, and the rococo, bric-a-brac "palace cars" of the last century could hardly be imagined. In fact, during the last year outside experts in interior decoration were employed for the first time by the railways, to design the furnishings and fittings of new passenger equipment.

While a few so-called "overnight" sleeping cars, equipped with single-bed rooms, were placed in service in 1927, the last year witnessed a marked increase in the number being operated, there being about 32 of these cars in service now between some 13 points.

Dining cars, as an integral part of passenger equipment, have also developed along the same lines in the way of decoration. Their equipment has also been improved, one of the outstanding developments in this regard being the installation of electric refrigeration.

Among the trains which have been completely re-equipped are several operating between Chicago and Omaha, New York, the Twin Cities, Florida and California.

Toward the end of the year experiments were being made with the equipping of passenger trains with express cars for carrying automobiles, so that the owner could drive his auto into the express car, board the same train and drive his auto out of the car immediately upon arrival at destination. It is believed that in a great number of cases passengers touring in automobiles are influenced in making this selection of transportation, not so much by the desire for making long drives, as by the desirability of having their own car at their disposal upon arrival at destination. The results of this experiment are being watched with interest by all railway passenger officers.

Day Coach Improvements

The improvements in equipment have by no means been confined to cars used by passengers paying the surcharge. The equipment of day-coaches has also undergone a change for the better in a number of instances.

Among the innovations are individual revolving seats, coat-hanger equipment, better lavatory facilities, including hot and cold water, with larger retiring rooms and, in many cases, the replacing of separate smoking cars or smoking compartments by smoking rooms. The new chairs are of the deep spring type, and the upholstery harmonizes with the finish of the car.

The New York Central initiated a new development in day-coach travel this year by the inauguration of a de luxe, all-day-coach train between Buffalo and New York. This train includes dining and observation cars. The coaches are equipped with rotating chairs of the bucket type.

Steel equipment is rapidly replacing wooden equipment throughout the country, the outstanding development in this connection being the purchase by the Pennsylvania of 631 new steel passenger cars, which, when completely installed, will provide that road with steel passenger equipment throughout.

Reduced Fare Activities

A number of interesting experiments were tried during the year, with varying success, to determine just what passenger traffic could be attracted by reduced rates. For example, to test the question of whether or not the cheapness of automobile travel causes passengers to use it, the Norfolk Southern sold round-trip tickets over much of its railroad for only a slight increase over the one-way fare. The experiment developed that while the cheaper cost of rail travel attracted some additional passengers the controlling factors were the frequency of motor coach service and the flexibility of terminal service.

In a somewhat similar way, between St. Paul-Minne-

The Day-Coaches Built in 1928 Contain Many New Features

apolis and Duluth-Superior, where the Great Northern, Northern Pacific and Minneapolis, St. Paul and Sault Ste. Marie operate a joint service, the rates were reduced to a parity with those of the coach lines and all excursion fares offered by the coach lines were met. This experiment is still being continued, as is a similar one between Seattle, Wash., and Vancouver, B. C., and it has been found that these reduced fares have, to some extent, retarded the loss in short haul traffic.

Considerable activity in the way of excursions marked the last year. These also were attended with varying results. One of the most unusual and successful developments along these lines has been the inauguration of long-distance, day-coach excursions. The Southern Pacific established such a service tri-weekly between San Francisco and Portland and Seattle when its Natron cut-off was opened two years ago. These trains were so well patronized that it was soon found expedient to run them daily and they have now become a regular, well-patronized service. The Southern Pacific has also conducted successful excursions from California points to Salt Lake City, Utah, and Ogden, a maximum possible trip of 2,600 miles, at a round-trip rate of $20. Similar coach excursions from Iowa points to the Pacific Coast are planned for the spring of 1929 by several roads and the results of this experiment should be awaited with interest.

Another innovation was the inauguration of a "Railroad Dollar Day" by the Boston & Maine, which was successful in attracting additional traffic over a holiday week-end, when round-trip tickets were sold between any two points on the road for one dollar over the one-way fare.

The so-called "back-home" excursions, from the larger cities to the rural districts, were more successful this year than ever before, while excursions to athletic events, primarily football games, retained a large degree of popularity and patronage. For example, 783 passengers were carried from Dallas, Tex., to New York, on four special trains, via the M.-K.-T., and the B. & O., for the Southern Methodist University game with the Army. Despite the increase in good roads,

The Modern Lounge Car Resembles a Well-Equipped Club

the inevitable parking difficulties and the constant threat of bad weather in the fall keep down the automobile traffic to distant football games, and the railways benefit accordingly.

Air-Rail Service

One of the most spectacular features of the year was the development of several joint air-rail routes and the inception of plans for a great many more. The first of these to get into actual operation was the airplane service between Chicago and Minneapolis-St. Paul. The Northwest Airways Company, operating this service, has traffic arrangements with the Great Northern, the Northern Pacific and the Chicago, Milwaukee, St. Paul & Pacific at the Twin Cities and with the Pennsylvania and the Baltimore & Ohio at Chicago, whereby passengers may use the airplane service between Chicago and the Twin Cities as part of their journey from the East to the Northwest, or in the reverse direction.

Another important arrangement, providing for a transcontinental air-rail service, has been entered into by the Pennsylvania, the National Air Transport Company, and the Atchison, Topeka & Santa Fe and will be inaugurated next spring. On the journey from New York to Los Angeles, for example, this arrangement will enable the passenger to travel by rail to Columbus, Ohio, thence by airplane to Dodge City, Kan., and thence by rail again to a point in New Mexico which has not as yet been definitely selected, thence by plane to Los Angeles, at a considerable saving in time over the all-rail route.

The New York Central has entered into an air-rail arrangement on its Chicago-New York service, whereby the passenger travels by rail from New York to Cleveland, thence by airplane to Chicago, or in the reverse direction, by plane to Cleveland, and rail to New York.

Likewise the Pan-American Airways, operating between Miami, Fla., and Havana, Cuba, have made traffic arrangements with the Chicago-Florida lines and the New York-Florida lines, in conjunction with the Florida East Coast, whereby passengers from New York or Chicago or intermediate points may use the airplane service betwen Miami and Havana, instead of rail-ferry service, at their option. The Illinois Central has effected traffic arrangements with the Chicago-St. Louis air lines, whereby round-trip tickets between those points are sold, by rail one way and air the other.

These are the more important air-rail services on which definite announcements have been made at this writing, but several other plans are in the formative stage, and there can be no doubt but that these beginnings mark the start of air-rail service that will develop rapidly in the next few years.

Freight Service Improvements

While the competition by the various transportation agencies as to freight, and particularly long-haul freight, has not been as keen as it has been for passenger traffic, the railways have improved their freight service materially none-the-less. In addition to a reduction in the schedules of freight trains, the on-time performance under these schedules has been materially better, while a more diverse and complete package car service has been developed during the past year.

The perishable shippers have been the beneficiaries of several important reductions in schedules, which in their case means an extension of markets, and, coupled with the on-time performances being made, enables them to operate with much greater assurance.

Several notable improvements have also been made in the scheduling of manifest freight trains, other than perishables, as well. Among typical examples of this, ninth-morning delivery is now provided from Chicago to Los Angeles and San Francisco, instead of tenth-morning delivery as heretofore. This schedule has been made effective this year by all lines concerned, and has reduced the time from Chicago to Denver 10½ hr. on the lines using that gateway, with similar reductions in time to all important intermediate points.

From St. Louis to Denver, the former time of 77½ hr. has been reduced to 67 hr., and from Kansas City to Denver, 55½ hr. to 44½ hr.

Through Chicago-Omaha trains now make the run in 24 hr. 10 min., a saving of 24 hr. in deliveries at Omaha on freight originating east of Chicago and received before 5 a.m. at Chicago.

Additional through Chicago-Twin Cities trains save 24 hr. in deliveries at St. Paul and Minneapolis, on freight delivered at Chicago before 5 a.m. This also effects a saving of 24 hr. to Seattle, Tacoma, Portland and other northwestern points, eighth-morning instead of ninth-morning delivery now being provided.

The Great Northern-Chicago, Burlington & Quincy now provide ninth-morning delivery from Seattle, Tacoma and Portland to Ft. Worth, Tex., instead of tenth-morning delivery as heretofore, while the St. Louis-Twin Cities lines now provide second-morning delivery between those points, as compared with third-morning delivery, as heretofore.

The Chicago & Eastern Illinois and the St. Louis-San Francisco have provided a new schedule of second-morning delivery from Chicago to Springfield, Mo., Joplin and Tulsa, Okla., instead of third-morning, and third-morning delivery instead of fourth-morning at Ft. Worth and Dallas.

The Florida East Coast has so scheduled its steamer train that 24 hr. is saved on traffic from the West to Cuban points. This also reduces, by approximately 12 hr., the schedule from the West to Miami and West Palm Beach.

The Chicago & Eastern Illinois has reduced the running time of its manifest train from Chicago to southern connections at Evansville, Ind., Chaffee, Mo., and Thebes, Ill., from 2 to 4 hr. each. The Chicago, Indianapolis & Louisville has reduced the running time of its trains between Chicago and Ohio river points from 2 to 4 hr. each.

The Illinois Central has reduced the schedule of its Chicago-Birmingham, Ala., and Chicago-Martin, Tenn., trains so as to provide a saving of 24 hr. to Florida and other southeastern destinations. From East St. Louis, Ill., to the same points, schedules have been reduced to provide a saving of 12 hr.

It will be observed that the railways are making the most of their advantages. The faster schedules available by rail are being made still faster, not merely in isolated instances, but, in general, throughout the country. The possibilities for more commodious and luxurious accommodations on trains than on automobiles are being exploited. Attractive rates are being offered to counteract, to some extent, the rates offered by the motor coach lines. As one of the principal sources of loss of traffic is in day-coach travel, every effort is being made to render it more attractive.

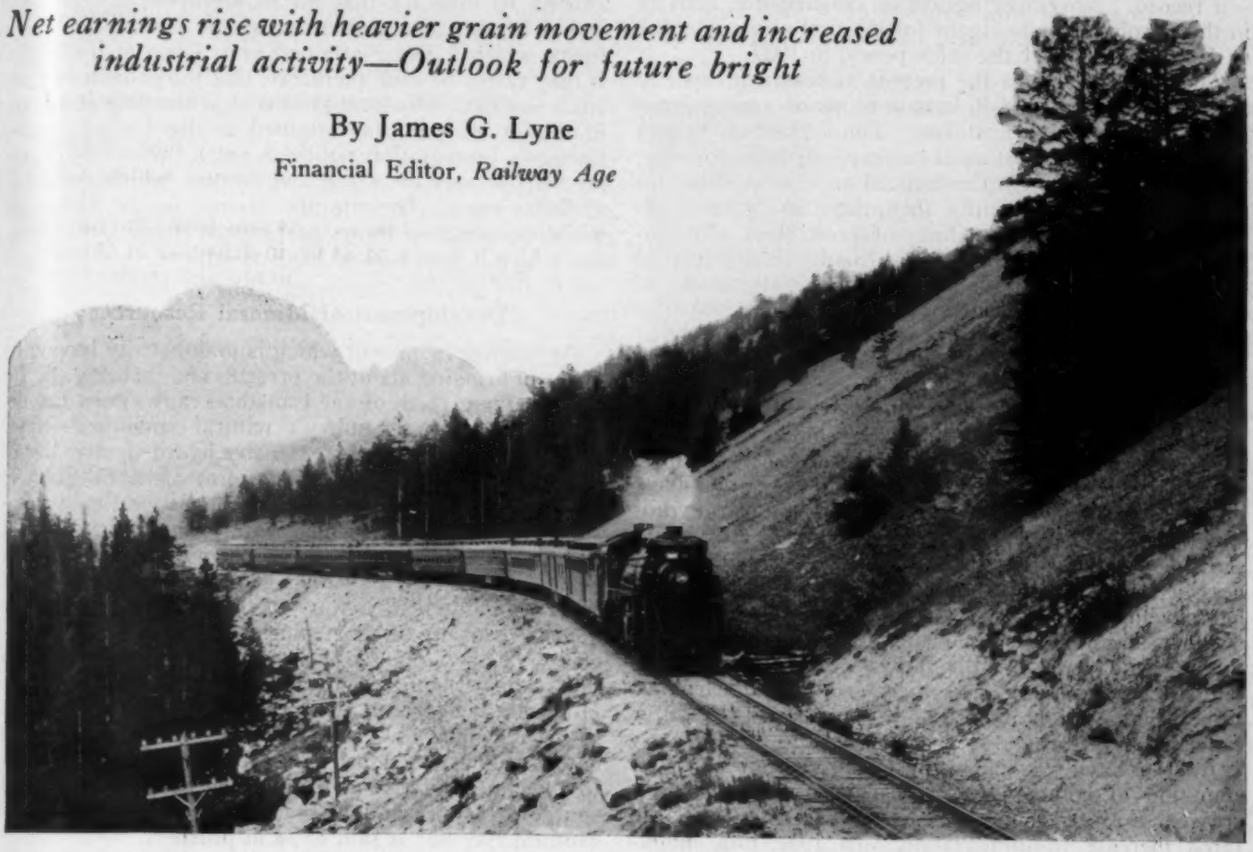
The year of 1928 presents an interesting picture of improved service, and several of the innovations are being watched with interest to see if one or more of them may not offer at least partial solutions to the traffic decline.

Canadian Lines Have Their Best Year

Net earnings rise with heavier grain movement and increased industrial activity—Outlook for future bright

By James G. Lyne

Financial Editor, *Railway Age*



The C. N. R.'s "Confederation" East of Jasper, Alta.

THE Canadian railways in 1928 enjoyed the best year in their history. Operating net of the Canadian Pacific for the first ten months of the year totaled $41,231,568, an increase of 31 per cent over the same period in 1927. The Canadian National's net for the first ten months of 1928 totaled $46,410,110, an increase of 34 per cent over the same period in 1927. The improvement in the showing of both roads was due to increased gross earnings, combined with an increase in operating expenses which was much less in proportion. Canadian National gross earnings for the first ten months of 1928 were $226,472,565, a total over 11 per cent greater than that of the same period in 1927. In the first ten months of 1928 the Canadian Pacific's gross earnings totaled $183,588,531, an increase of 14 per cent over the same period of 1927. The Canadian National for the ten-month period had an operating ratio of 79.51—the lowest point yet reached by this ratio for this period since the properties were combined under one management. The operating ratio for this same period in 1927 was 82.95.

The increase in gross earnings, it is to be noted, manifested itself during the first half of the year, when traffic is normally comparatively light and this increase was greatly augmented in the fall when the grain crops began to move.

A Record Grain Crop

A great share of the increasing prosperity in Canada is due to the large grain crop. However, other commodities have also shown important increases. Car loadings of grain and grain products for the year up to the week ended December 1, 1928, totaled 31 per cent more than for the similar period of 1927 and were 32 per cent ahead of the same period in 1926. For the 11-month period of 1928 loadings of pulpwood were 13 per cent over those of 1927 and 28 per cent over 1926. Ore loadings were 15 per cent higher than in 1927 and 12 per cent greater than in 1926. Cars loaded with l.c.l. freight were five per cent greater than in 1927 and nine per cent greater than in 1926. Loadings of miscellaneous freight were nine per cent more than in the eleven-month period of 1927 and 14 per cent above the total for that period of 1926. Cars received from connections totaled six per cent more than the number received in 1927 and 1926.

Other Traffic Also Heavier

Both sections—east and west—of the country have shared in this increased production, the Eastern district reporting 4 per cent more cars loaded in the eleven months of 1928 than in the same period in 1927 and seven per cent more than in the similar period of 1926. The car loadings in the Western district were 20 per cent greater in the eleven-month period of 1927 and 27 per cent higher than for the same period of 1926.

It may be pointed out that prosperity in business and industrial sections generally comes *after* success on the farms. Thus it happens that the increase in traffic on the western lines has not yet been overtaken by that on the eastern lines. The large crop in the West this year, however, holds out great promise for continued good

traffic conditions, comparatively speaking, for at least the first half of the ensuing year. The 1928 wheat crop in Canada, it is estimated, will reach 525 million bushels —a record. November figures on construction activity in the Dominion show a gain for the first eleven months of 18.5 per cent over the same period in 1927.

An interpretation of the present increased prosperity of Canada and of its railroads in terms of a good grain crop alone would be mistaken. The carloading figures given above show substantial increases in other tonnage, which, if the grain crop influenced at all, would not do so until next year. Plainly, then, there is a general advance in many important lines of production and consumption in Canada and the railroads, having placed themselves in a favorable position from a standpoint of efficiency, have been able in spite of a low rate level to carry over a substantial proportion of the proceeds of increased business into net revenue.

Passenger Business Increasing

The Canadian railways, moreover, do not have the drain on net revenues of a continued loss of passenger business which most railways south of the border have suffered. Passenger revenues of both the large railways increased in 1927 over 1926 and in 1928 were showing further increases over 1927. Short-haul business, it is true, has been declining, but long-haul traffic has developed rapidly enough to more than offset this decline. With passenger business showing such a favorable trend, naturally the railways have been able to realize completely on their increased freight earnings, rather than see an important proportion of the latter cancelled by passenger service losses.

Another factor in increasing the production and consumption of commodities in Canada—making for increased railway business—has undoubtedly been the rapid increase in immigration. In 1927 total immigration was 148,000 and for the first ten months of 1928 alone it reached 154,000. This latter total bears the same proportion to the present population of Canada (about 10 million) that an immigration of 1,800,000 would bear to the population of the United States—a figure which it never attained even when at its height. It may safely be said, therefore, that the growth of Canada's population by immigration is proceeding at as rapid a rate as ever was attained in the United States. Canada's immigration policy is not a "wide-open" policy; it operates on a selective system which definitely excludes racial elements not desired in the Dominion while encouraging those, particularly from Great Britain, which it does wish to have as settlers.

Development of Mineral Resources

Another development which is undoubtedly having its effect in bringing about the present, and insuring the future, traffic growth of the Canadian railways, is the development of the country's natural resources—water power and mineral. The extensive hydro-electric installation for aluminum manufacture at Lake St. John in northern Quebec is well known. A railroad is in progress of construction which will connect the lines in eastern Saskatchewan with Hudson Bay. This line is being built by the Canadian government at the behest of agrarian interests in the Prairie provinces, for the announced purpose of shortening the haul on grain to tidewater. Expert opinion has decried the building of this line, saying that grain traffic will never develop on it. However, it begins to appear that the line may not have to depend upon the carrying of grain. A huge mining enterprise has developed in the Flin Flon area tributary to this line and this industry is already an important source of traffic; and further mining activity along the Hudson Bay line is said to be in prospect.

The C. P. R.'s "Trans Canada Limited"

Steel of the new line will probably reach Churchill, the terminus on Hudson bay, during the coming winter months. This does not mean that the line will then be opened for commercial traffic, however. As a matter of fact track will be laid this winter over the ice and snow and over this line ballast and fill will be hauled to complete the construction after the spring thaw.

Ontario Line Increases Earnings

Another railway built entirely for development purposes, the Temiskaming & Northern Ontario, which was built and is owned by the provincial government of Ontario, is proving to be a producer of revenue. For the fiscal year ended October 31, 1927, it had net earnings of $1,211,580. This is not a large return upon a capital investment of over 36 million dollars, but it is a trend, nevertheless, in the right direction. The annual report of this road points out that 16 years ago the gold output of Ontario mines was but $43,000, whereas in 1927 it approximated 33 millions. The report also states that the precious metals mines served by the T. & N. O. in the few years such operations have existed have paid 173 millions in dividends. Developments of a similar striking character have taken place in the Rouyn district of Quebec near the Ontario boundary, a short distance south of the National Transcontinental Line of the Canadian National.

Another line, the Edmonton, Dunvegan & British Columbia with subsidiaries, was built by the province of Alberta to develop the fertile Peace river district in the northwestern part of that province. This line has recently been sold by the Alberta government to the Canadian Pacific and the Canadian National which will operate it jointly and extend it to further promote settlement and production in this rich region.

There was considerable construction activity by the Canadian railways during 1928. The details are enumerated elsewhere in this issue. The Canadian Pacific during the year built 378 miles of new line and had an additional 55 miles under construction at the close of the year—this in addition to improvements made on existing lines. The Canadian National built 144 miles of new line during the year and had 166 miles under construction at the close of the year. The Canadian National ordered 60 locomtives, 4,200 freight cars and 161 passenger train cars. The Canadian Pacific ordered 30 locomotives, 4,630 freight cars and 185 passenger train cars. These details, likewise, are given elsewhere in this issue.

From a standpoint of development in equipment design, there have been two or three interesting examples in Canada during the past year. Among these must be mentioned the powerful oil-electric locomotive for main line service designed by the Canadian National and described in the *Railway Age* of December 8, page 1125. The Canadian Pacific has recently built at its Angus shops and placed in service two 4-8-4 type locomotives of special design which are said to be the largest passenger locomotives in the British Empire. The Canadian National placed in service of the Central Vermont 10 Texas type freight locomotives, which have materially aided that road in building up its operating efficiency following the disastrous floods which suspended its operations for months, beginning the early part of November, 1927.

Summary of Revenues and Expenses

Summarized briefly, the Canadian railways as a whole in the first nine months of 1928—the latest date for which complete figures are available at this writing—had operating revenues of $389,227,575, an increase of 10 per cent over the same period in 1927. Net operating revenues were $69,331,106, an increase of 26 per cent over 1927. In the first nine months of the year the Canadian National's United States lines produced 17 per cent of its operating revenues. For the lines of the Canadian National in the Maritime provinces separate accounts have been kept following an arbitrary legislative reduction in rates in 1927, so that deficits accrued may be directly charged to the government. These lines had an operating deficit for the first nine months of 1928 of $5,446,527. In the month of September alone this deficit was $600,688, which was smaller by $26,425 than the deficit for the same month in 1927. Although the government subsidy to Maritime shippers is proving expensive, nevertheless there are indications that as business increases this burden may tend to become lighter.

The C. N. R.'s "Acadian" Between Montreal and Halifax

Sir Henry Thornton, president of the Canadian National, in a recent address at Toronto stated that the system would probably earn in excess of 50 million dollars this year. He called attention to the fact that earnings in 1922 were about three millions, which, capitalized at 5 per cent, would represent a property worth $60,000,000. The 1928 earnings, capitalized on the same basis, would show the property to be worth a billion dollars. The Canadian National is earning interest on all its debt in the hands of the public, but not on all that being held in the Dominion treasury. Not all of this Dominion debt represents capital expenditures, but a substantial proportion consists of advances made to pay past deficits.

The likelihood of the property earning a return on all these obligations seems remote and, to correct this situation, it is considered probable that some attempt will be made to secure authority for a financial reorganization to bring the capital structure down to a figure more in keeping with the probable earning power.

The Canadian Pacific in 1928 maintained and added to its strength as one of the major transportation enterprises of the world, and one of the largest, strongest and most stable corporations of whatever character. It began the year with a surplus of six millions after the regular 10 per cent dividends on common stock in 1927 and it is to be noted that the railway's earnings in 1928 were running far ahead of those of 1927. The company's stock was selling in the New York market at 227 on December 7, 1928, as against 209 on December 9, 1927.

Colonia Terminal Station, Mexico City

Improved Efficiency in Mexico

National lines show better operating results but are handicapped by a vast bonded debt

By Lic. Ezequiel Padilla

Member, Board of Directors, National Railways of Mexico

WHEN Sir Henry Thornton was in Mexico, in his first interview with President Calles, he said, "I do not know whether the invalid (referring to the National Railways of Mexico) will want to take the medicine." To this the President replied, "It will take it even if it has to grit its teeth."

The report submitted by Sir Henry and his staff of specialists has remained in the most profound mystery. Even the board of directors of the railways ignore it; however, in the last two years the problem of the railways has occupied one of the first places in the attention of Mexican statesmen. Nothing shows this sentiment more clearly than the probable election of General Calles as executive president, he having just quitted the presidency of the Republic, possessor of enormous moral courage and great experience as an administrator. A business point of view as opposed to the political prevails at the present time in the administration of the railways.

Activity of Unions

During the days of De La Huerta the railway unions by political means exacted of the company extraordinarily onerous privileges. A constant work of persuasion and a firm attitude on the part of the railway management has been necessary to direct gently to their proper course the privileges enjoyed by the powerful railway unions. Among these privileges none did so much harm to the administration as the right, which the unions actually exercised, of designating the personnel. At the present writing the general superintendency of transportation, which is in charge of train service, office forces and the telegraph department, has just taken over the selection of the officers of the railways, departing from ancient forms in overturning the radical idea that seniority ought to take precedence over ability and technical knowledge. On the National Railways of Mexico, it is now assured that competence will be the first requirement for official positions.

Working Agreements Easily Reached

In the readjustments and setting to rights which are being tenaciously carried out, it is only fair to recognize that the workers have been actuated by conviction. The Labor Law is now being discussed in Mexico. Perhaps the most outstanding characteristic of these deliberations, going deeper than the figures and specific points at issue, has been the ease with which the unions have reached agreement among themselves and also with the representatives of the management. This proves that it is the leaders who muddy the waters. The new Labor Law will provide for the readjustment of the perogatives of the unions and will establish equity and co-operation with the management.

The reduction obtained in overtime payments for train service and other transportation employees is an evidence of the equity and justice of the new relations between the administration and the employees. The sum spent for this purpose in the month of April, 1927, amounted to 219,731 pesos and in the same month this year the sum was 94,000 pesos, a decrease of 124,000 pesos having been secured. Overtime payments in years past have averaged five million pesos per annum. It is to be hoped that the effort toward reduction will lower this figure to less than half.

It is difficult to understand the courage which has been necessary to maintain relations of equity between the administration and the unions in the face of the revolutionary ideology which dominates the Mexican Republic. For many years these relations constituted a problem the only solution of which was public force opposed to the continuous strike threats. Now it can be said that these relationships, thanks to the tact of the higher officers, are cordial.

Treatment of Ties a Great Economy

The policy with reference to cross-tie replacements has frequently been pointed out as one of the expenses which was bleeding the National Railways. This costly situation is being improved each day by more careful supervision and by new methods of tie conservation. In step with the most progressive railways of the world the Mexican National lines have established treating plants in Durango and Perote. In Acambaro a plant for treatment with Basilite has been installed. Treatment by either of these two processes assures a life of not less than 15 years for each tie. These plants are turning out 7,000 ties a day. In the records of the National Railways average tie life is shown to be eight months in wet sections and two years in dry climate. These figures enable one to appreciate in all its significance the enormous economy which these improvements mean to a management which maintains approximately 20 million ties.

Average kilometers per car day in August were 75.1 on standard gage lines, 35 on narrow gage and 57.5 on the Interoceanic. The percentage of loaded to total car miles was 70.4 on standard gage lines, 72.6 on narrow gage lines and 17.5 on the Interoceanic. Most of the traffic on the standard gage lines is long-haul.

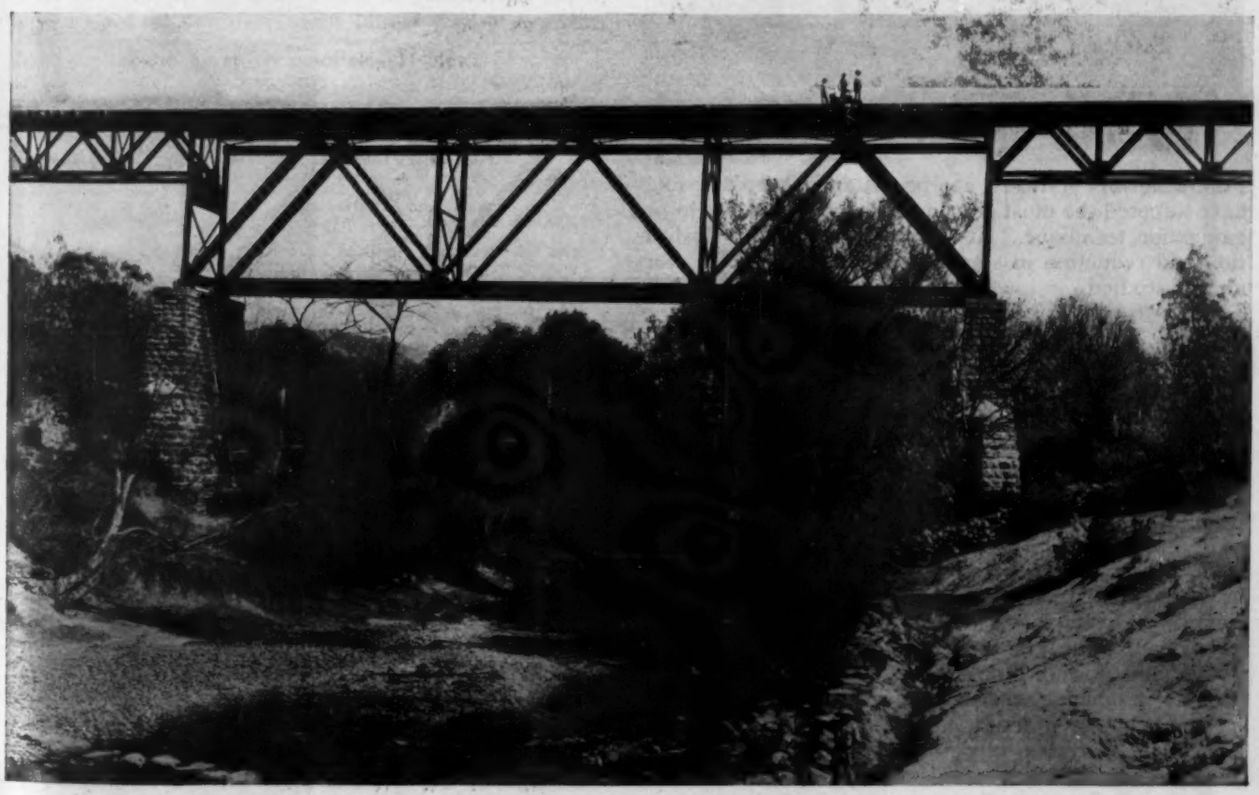
These results attained offer comparison with those of the North American railways, and all this notwithstanding the present depression in business and production. Table I gives some comparative revenue and expense statistics.

These statistics are loaded down with the heavy ballast of the operated lines (National of Tehuantepec, Oaxaca to Ejutla and Alvarado) which for a long time have been operating in out-and-out bankruptcy piling up their heavy deficits on the management. This problem, which includes also the burden of the Interoceanic of Mexico, constitutes one of the serious preoccupations of the present administration.

Table I—Comparative Revenues and Expenses

Periods	Total Freight Revenues	Freight Operating Expenses (Approx.)	Revenue Tons Metric	Av. Cost per Ton Kilometer	Av. Receipts per Train Kilometer	Av. Cost per Train Kilometer
	Pesos	Pesos	Tons	Centavos	Pesos	Pesos
Jul. to Dec., 1926	34,481,800	32,901,612	3,480,076	2.266	4.420	4.218
Jan. to Jun., 1927	35,867,585	32,889,859	3,761,162	2.249	4.697	4.307
Jul. to Dec., 1927	35,082,432	32,060,306	3,593,282	2.136	4.504	4.116
Jan. to Jun., 1928	38,185,072	30,935,266	3,921,539	1.930	4.834	3.916

During 1928 the tonnage of freight handled was increased while at the same time reductions in average receipts per ton were made. This has undoubtedly benefited the public which paid in a measurable degree less than it paid in former years, being 9.73 pesos on standard gage lines as compared with 9.91 pesos in 1926;



A Bridge on the National Railways

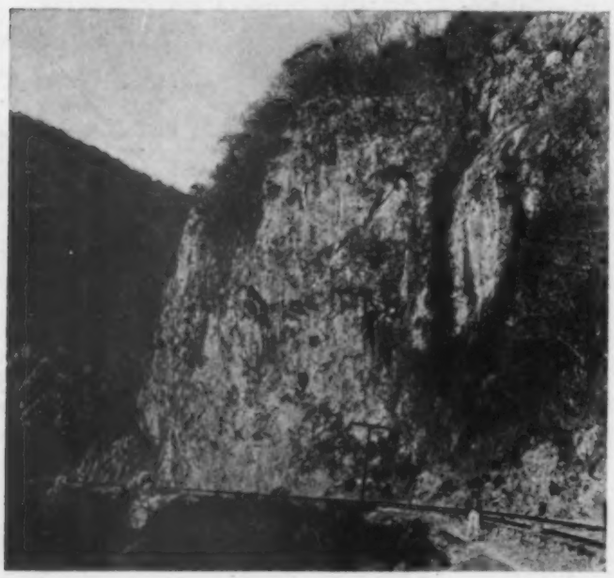
and at the same time receipts per ton-kilometer increased from 2.33 centavos in 1927 to 2.406 centavos in 1928. All this accomplishment is due to the careful and scientific adjustment of tariffs.

It is important to notice the improvement in the operating ratio:

	National Rys.	Interoceanic
July to Dec., 1926	94.55 per cent	121.98 per cent
Jan. to June, 1927	93.74 per cent	107.38 per cent
July to Dec., 1927	94.36 per cent	128.46 per cent
Jan. to June, 1928	85.89 per cent	95.07 per cent

The brilliant results of the first half of the year will be noticed, thanks to the drastic measures of economy. It is well to bear in mind that in this operating ratio is included the 10 per cent which the National Railways pay to cover the railway debt, under the terms of the Lamont-De La Huerta and Lamont-Pani agreements.

The National Railways of Mexico are organized on the departmental system with divisional features patterned after the New York, New Haven & Hartford.



La Mano Canyon on the Mexico-Balsas Line

Following this system it can be asserted that these lines have adopted the most advanced accomplishments in organization technique. At the present time standardization and reduction in stocks of materials is being thoroughly studied.

Improved Passenger Service

The service of the National Railways, freight as well as passenger, has won the praise of North American experts who make it possible to say that this service is superior to that of any European railway, with the exception of the German lines, and comparable in many points with the American railways. The "Star" trains, brought up-to-date and vestibuled like the best cars in existence, with a magnificent dining service and a run from Mexico City to Laredo (1291 kilometers) in 30 hr. 35 min., which may very well be reduced to 24 hours, are examples of safety and comfort for passenger travel. The National lines have on the Cardenas (Montañosa) and Monterrey-Gulf divisions the only selective telephone service in Latin America. This service is the most practical, quickest and safest for the movement of trains, obviating as far as humanly possible the likelihood of accidents.

But regardless of all the successes of the National Railways, permanent or transitory, they continue like Laocöon, stifled in the folds of their enormous debts.

The history of the railways of any country is a summary of the courage, foresight and energy of its more vigorous generations. But the exhilarating episodes of railway construction in Mexico acquire marks of extraordinary severity. In the United States the railway companies were able to shake off the burdens of early speculation and the corruption of promoters by means of frequent reorganizations. Weighing on the Mexican National lines, after a half century of accumulated overcapitalizations, are all the inflated issues which represent the original sin of these lines.

Bonded Debt Never Scaled Down

This is how the impressive figure of the debt of the National Railways of Mexico is explained—a debt which amounts approximately to 250,000,000 pesos. In this sum are included the tempting fantasies of the promoters and their fabulous profits, promoters who did not hesitate to accumulate numerous ciphers on their first optimistic calculations and leave them behind as an inheritance for their successors. On these lines there have been no readjustments, refunding or consolidation of indebtedness to bring fantastic figures into touch with reality, such as has occurred on innumerable private lines in the United States.

The Minister Limantour in bringing about the nationalization of the lines trusted that peace in Mexico would be perpetual and that the potential wealth of this country would take care of the heavy debts which the railways suffered in their early operations.

Surely the data shown in Table II on the nominal value of the mortgage bonds and their quotation in the market should excite a sentiment of equity and human sympathy, regardless of the rigid financial figures.

These figures reveal an enormous margin and point to the advisability of a consolidation of the debt of the railways, which would leave possibilities for their rehabilitation. The market value of the outstanding bonds is 37,256,000 pesos. On the other hand their nominal value, which has never undergone any adjustment, is 216,693,000 pesos.

Table II—National Railways Bonds

Nominal Value Pesos		Market Value Pesos
23,000,000	Natl. de México, Prior Lien, 4½s-1926 at 29	6,670,000
24,740,000	Natl. de México, Cons. Gold, 4s-1951 at 18	4,453,200
84,804,115	Natl. de México, Prior Lien, 4½s, 50 yr. Stg. Fundg. red. Gold Bonds-1957 at 20	16,960,823
50,748,575	Natl. de México, gem Mtge, 4s-1977 at 17	3,552,400
7,000,000	V'Cruz & Pacific, 1st, 4½s-1934 at 21 (last operation Sept. 23/24)	1,470,000
5,850,000	Mex. Intl. 4½-1947 at 19 (last operation May 19/24)	1,111,500
4,206,500	Mex. Intl. 1st Gold (cons.)-4s-1977 at 12	504,780
2,003,000	Pan American 1st Gold 5s-1934 at 17½	350,525
1,484,000	Pan American General Gold 5s-1937 at 17½	259,700
1,374,000	Mex. Central Cons. 5s-1939 at 17½	240,450
9,483,200	Tehuantepec Ntl. 5s at 15	1,422,650
2,000,000	Tehuantepec Ntl. 4½s at 13	260,000
216,693,390		37,256,028

It is impossible to understand the unequal and desperate battle which the National Railways are waging, economizing and pressing plans of reconstruction to reach the goal of complying in full with their obligations. But over their heads in debt they have to ask continually: What is the way out? Dwight W. Morrow while still with the House of Morgan on the eve of taking up his important duties as ambassador to Mexico said that it is poor business to kill a creditor. This sage sentiment of common interest between debtors and creditors can never claim its application with more justice than at the present time when a new agreement with the banker's committee is up for consideration.

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A Year of Activity in Construction

More than 1,000 miles of new lines built—Large expenditures made for other railway facilities

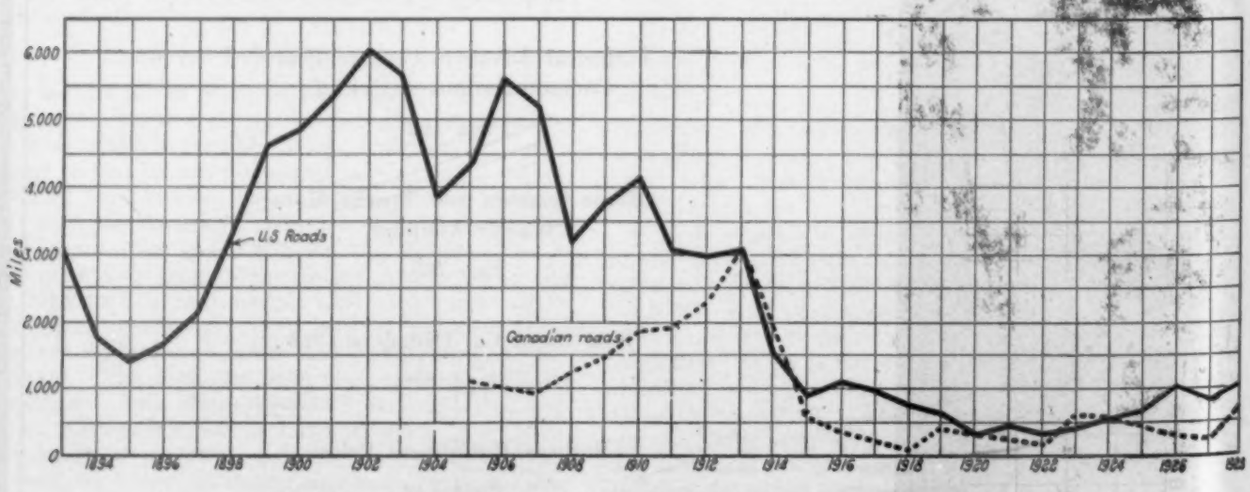
By F. M. Patterson
Associate Editor, *Railway Age*

The Lackawanna's New Hackensack River Bridge

THE activity which has featured the construction of new lines and of additions and betterments to existing lines in the United States during the last few years continued during 1928. The mileage of new lines built totaled 1,025 miles, an increase of 246 miles, or approximately 32 per cent, over that constructed in the preceding year. This is a larger mileage completed than in any year since 1916, although it exceeds the total for 1926 by only 20 miles. The record last year was accounted for primarily by the completion of several important projects which had been started in previous years, while the mileage of new lines still under construction or projection for 1929 forecast a considerable total next year, although this may fall short of that completed in 1928.

The mileage of second track built during the year was considerably smaller than in 1927, the total of 271 miles comparing with 447 miles in 1927, a decrease of 176 miles, or 40 per cent. It is interesting to note that in the period since 1925, during which there has been a marked increase in the amount of traffic handled by the railways, there has also been a marked decrease, year by year, in the amount of second track constructed. Whereas the construction of second track was formerly almost the first form of relief for congestion of traffic, the tendency of the present to increase the capacity of the existing facilities by the installation of signaling, remote control of passing track switches and heavier power has resulted in the postponement of such construction until these various agencies function to the limits of their capabilities. The greater part of the second track built in 1928 was installed by a few of the larger roads, in pursuance of programs for double-tracking important parts of their systems.

The major projects among the new lines fall into three classifications: Those built to develop new terri-



New Line Mileage Constructed in the United States and Canada

tory; to furnish lines with easier grades than the existing lines, or to furnish new outlets for traffic. In the first classification is included the 205 miles built by the Colorado & Southern in the Panhandle of Texas, which constitutes one of the largest projects, in point of mileage, constructed as an entity in recent years. In the second classification is the new 120-mile line of the Illinois Central from Edgewood, Ill., to Metropolis, which, with the 42 miles between the Ohio river at Metropolis and Fulton, Ky., placed in service in 1927, provides a line with maximum grades of 0.3 per cent, as compared with 0.8 per cent on the main line via Cairo, Ill., and at the same time effects a saving of 22 miles in distance. The completion of 94 miles by the St. Louis-San Francisco, between Aliceville, Ala., and Kimbrough, together with the rehabilitation of the Muscle Shoals, Birmingham & Pensacola, a subsidiary, affords the Frisco a through route to the Gulf of Mexico at the port of Pensacola, Fla. It is interesting to note that these three projects represent over 40 per cent of the total mileage construction during the year.

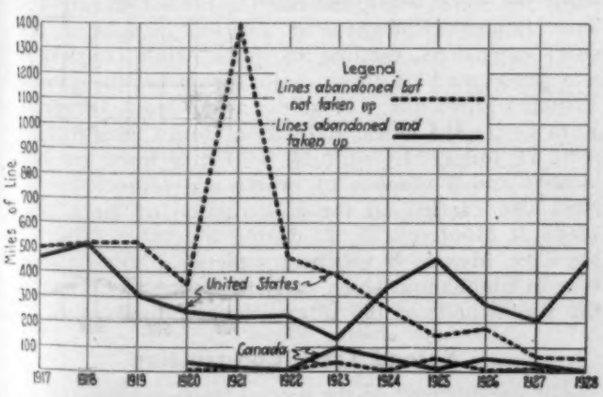
Other lines to furnish facilities in new territory included a branch of the Great Northern from Saco, Mont., to Hogeland, to furnish transportation facilities to an agricultural region, and a similar line built by the Union Pacific from Egbert, Wyo., to Creighton, 54 miles. The Texas & Pacific, through two of its subsidiaries, built 66 miles in western Texas, and the Northern Pacific placed in service a new line between Glendive, Mont., and Brockway, 62 miles, while it also built a line 24.5 miles long on the easterly side of the Bitter Root river in Montana, between Florence and Hamilton, to replace a line on the westerly side of the river, in order to make its stations more accessible to its patrons. The Southern Pacific built 18.5 miles of line on its Globe branch in Arizona between Calva and Peridot to replace a similar mileage which had to be abandoned on account of the construction of the Coolidge dam by the government. The Alabama, Tennessee & Northern built 30 miles to secure an independent entrance, with favorable gradients, to Mobile, Ala.

Miles of New Line Completed in the United States Since 1893

1893	3,024	1911	3,066
1894	1,760	1912	2,997
1895	1,420	1913	3,071
1896	1,692	1914	1,532
1897	2,109	1915	933
1898	3,265	1916	1,098
1899	4,569	1917	979
1900	4,894	1918	721
1901	5,36E	1919	686
1902	6,026	1920	314
1903	5,652	1921	475
1904	3,832	1922	324
1905	4,388	1923	427
1906	5,623	1924	579
1907	5,212	1925	644
1908	3,214	1926	1,005
1909	3,748	1927	779
1910	4,122	1928	1,025

Miles of New Line Completed in Canada Since 1904

1904	316	1917	207
1905	1,181	1918	135
1906	1,007	1919	433
1907	976	1920	305
1908	1,249	1921	252
1909	1,488	1922	145
1910	1,844	1923	655
1911	1,898	1924	615
1912	2,232	1925	414
1913	3,013	1926	335
1914	1,978	1927	310
1915	718	1928	723
1916	290		



Miles of Line Abandoned in the United States and Canada

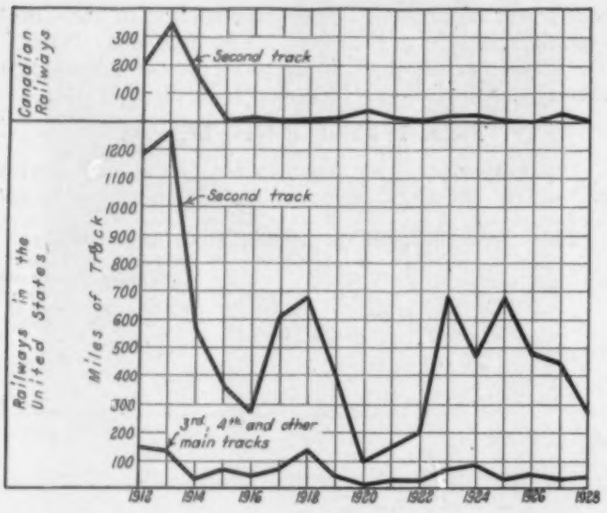
Texas Is First in New Mileage

Texas leads in the construction of new lines, with 353 miles. In addition to the construction already re-

Lines Abandoned in the United States and Canada

	Lines abandoned and taken up Miles	Lines abandoned but not yet taken up Miles
United States		
Baltimore & Ohio		
Millersburg, Ohio, to Wooster	....	18.00
Bare Rock		
Murdock, Pa., to Bare Rock	2.50	....
Black Mountain		
Just south of Burnside, N. C.	0.75	....
Bullfrog Goldfield		
Beatty, Nev., to Goldfield	80.00	....
Chicago, Milwaukee, St. Paul & Pacific		
Tanwax Junction, Wash., to Tidewater	2.08	....
Chicago, Rock Island & Pacific		
Iowa City, Iowa, to Digby	5.96	....
Jacksonport, Ark., to Newport	3.45	....
Colorado & Southern		
Blackhawk, Colo., to end of line	0.46	....
Blackhawk, Colo., to Central City	....	3.45
Hilltop Junction, Colo., to Leavick	....	11.33
Kokomo, Colo., to Wilfley Mill	....	1.10
Eastern Kentucky		
Riverton, Ky., to Grayson	22.61	....
Great Northern		
Peshastin, Wash., to Winton (change of location)	20.57	....
Illinois Central		
Brookhaven, Miss., to Monticello	20.06	....
(Yazoo & Mississippi Valley)		
Moores, Miss., to Lamont	3.70	....
Lehigh Valley		
Mahanoy City, Pa., to Barry Junction	2.46	....
Missouri Pacific		
At Larned, Kan.	0.91	....
Long Island		
Sheepshead Bay, N. Y., to Neck Road	0.52	....
Northern Pacific		
Pinehurst, Mont., to Trout Creek	15.89	....
Florence, Mont., to Hamilton (change of location)	23.72	....
Oakdale & Gulf		
Oakdale, La., to Pine Prairie	17.64	....
Pajaro Valley Consolidated		
Spreckels, Cal., to Watsonville	27.30	....
Branch	12.80	....
Pennsylvania		
Fishing Creek, Pa., to Rock Run, Md.	16.01	....
Carmona, Pa., to Redmond	4.86	....
Woodsfield, Ohio, to Lawton	59.13	....
Lawton, Ohio, to Zanesville	....	9.12
Strasburg, Ohio, to Harwalk	....	1.39
Clarksville, Ind., to Jeffersonville	0.94	....
Potato Creek		
Betula, Pa., to Hamlin	5.25	....
Reading		
At Harrisburg, Pa	0.96	....
Shippensburg, Pa., to Lurgan	1.10	....
At Ringtown, Pa	0.61	....
At West Bear Ridge	0.43	....
St. John & Ophir		
Ophir, Utah, to St. John	8.56	....
St. Louis-San Francisco		
Stanley, Kan., to Belton, Mo.	....	8.52
Seaboard Air Line		
Welcome Junction, Fla., to Welcome	2.26	....
Southern		
Morristown, Tenn., to Corryton	39.60	....
Southern Pacific		
(Arizona Eastern)		
Calva, Ariz., to Peridot	18.46	....
(Central Pacific)		
Weed, Cal., to Grass Lake	19.53	....
Thornton & Alexandria		
Thornton, Ark., to Rock Island Junction	....	13.00
Union Pacific		
(Oregon Short Line)		
At Feeley, Mont.	1.60	....
(Los Angeles & Salt Lake)		
At Rialto, Cal.	0.40	....
Western Maryland		
Hanover, Pa., to Cold Spring	3.37	....
Total	446.45	65.91
Canada		
Canadian National		
Ballantrae, Ont., to Zephyr	10.66	....

ferred to in that state, the Chicago, Rock Island & Pacific completed 24 miles of its projected line between Amarillo, Tex., and Liberal, Kan., while the Quanah, Acme & Pacific, a subsidiary of the St. Louis-San Francisco, completed and placed in service, 28 miles of road between McBain and Floydada, and the Gulf Coast Lines of the Missouri Pacific completed 31 miles near the Rio Grande. Montana ranked second in the



Multiple Track Mileage Constructed in the United States and Canada

construction of new lines, with 163 miles; Illinois, with 127 miles, was third, and Alabama was fourth with 124 miles.

The mileage of new lines under construction, or for which contracts have been let, was somewhat smaller at the end of 1928 than at the end of the preceding year, forecasting a decrease in new road for 1929.

New Track Built in 1928

United States	Number companies building	First track	Second track	Third track	Fourth or more track	Total
Alabama	2	123.56	....	....	....	123.56
Arizona	3	39.64	33.96	....	....	73.60
Arkansas	1	0.66	....	....	....	0.66
California	2	....	12.62	0.12	....	12.74
Colorado	1	....	2.73	....	....	2.73
Connecticut	1	0.49	....	....	....	0.49
Florida	2	24.50	....	....	....	24.50
Georgia	1	....	5.24	....	....	5.24
Idaho	2	....	20.60	....	....	20.60
Illinois	4	126.83	3.16	2.55	....	132.54
Indiana	3	....	7.90	....	....	7.90
Kansas	1	6.96	....	....	....	6.96
Kentucky	1	1.00	....	....	....	1.00
Louisiana	1	....	32.00	....	....	32.00
Maryland	1	9.00	....	....	....	9.00
Massachusetts	1	....	8.65	....	....	8.65
Michigan	4	2.19	9.64	....	....	11.83
Minnesota	2	3.53	6.99	....	....	10.52
Missouri	1	....	19.16	0.20	....	19.36
Montana	2	163.04	....	....	....	163.04
Nevada	1	1.18	....	....	....	1.18
New Jersey	4	3.10	1.41	12.16	10.68	27.35
New York	3	....	19.52	9.50	9.50	38.52
Ohio	5	11.00	20.37	....	....	31.37
Oklahoma	1	20.00	....	....	....	20.00
Oregon	1	26.00	....	....	....	26.00
Pennsylvania	2	12.15	2.18	0.80	....	15.13
South Carolina	1	3.00	....	....	....	3.00
Tennessee	1	....	1.85	....	....	1.85
Texas	6	353.30	30.76	....	....	384.06
Utah	1	....	0.64	....	....	0.64
Washington	1	19.37	....	....	....	19.37
West Virginia	1	12.00	5.48	....	....	17.48
Wisconsin	2	2.84	26.00	....	....	28.84
Wyoming	2	59.88	....	....	....	59.88
Total, United States		1,025.22	270.86	25.33	20.18	1,341.59
Canada						
Nova Scotia		....	0.27	....	....	0.27
Quebec		1.30	....	....	....	1.30
Ontario		15.00	....	....	....	15.00
Manitoba		146.10	....	....	....	146.10
Saskatchewan		333.30	....	....	....	333.30
Alberta		226.90	....	....	....	226.90
Total, Canada		722.60	0.27	....	....	722.87
Mexico		58.01	....	....	....	58.01

Among the larger projects now under way is a line being built by the Southern Pacific from Klamath Falls, Ore., to Alturas, Cal., 95 miles, which, in connection with the Nevada-California-Oregon, which was widened to standard gage and rehabilitated during the last two years, will afford a new outlet to the East for traffic from Washington and Oregon, which will avoid the haul over the Sierra Nevada mountains. In addition, this line will open to traffic what is said to be the largest stand of virgin timber in the United States. The Waco, Beaumont, Trinity & Sabine has 209 miles under construction in Texas. The Mound City & Eastern is building 70 miles from Mound City, S. D., to Leola, to furnish transportation to a region now devoid of railways, and the Panhandle & Santa Fe, a subsidiary of the Atchison, Topeka & Santa Fe, is building 81 miles between Pampa, Tex., and Cheyenne, Okla. As a result of recent authorizations by the Interstate Commerce Commission, construction has begun on several lines in West Virginia. The Virginian has awarded contracts for 16.5 miles of its projected 42-mile line between Itmann, W. Va., and Gilbert; the Norfolk & Western, through a subsidiary, has started construction on a line from Wharncliffe, W. Va., to Gilbert, while the Big Sandy & Cumberland, by the widening and rehabilitation of 12 miles of narrow gage line from Devon, W. Va., to Hurley, Va., the construction of 14 miles from the latter point to Levisa river, and the widening and rehabilitation of 13 miles of non-carrier narrow-gage road along Levisa river to the Virginia-Kentucky stateline, will provide a standard-gage line 39 miles between these points.

Mileage of New Lines Increased in Canada and Mexico

The construction of new lines in Canada showed a marked increase over 1927, amounting to 723 miles, as compared with 310 miles in the preceding year, an increase of 413 miles, or 133 per cent. This figure is likewise larger than that for any year since the outbreak of the war stopped all construction activities in 1914. Of this year's total, the Canadian National built 291 miles and the Canadian Pacific 378 miles, principally in the Western provinces. The Hudson Bay Railway was extended 59 miles during the year, and the branch to the Flin Flon mining district from a connection with the Hudson Bay near The Pas, Man., 87 miles, was completed. The total mileage under construction or contract, together with the activity in agriculture and mining forecasts a fairly large addition to Canada's transportation system during 1929.

Railway construction in Mexico, which has been dormant for some years, indicated a revival during 1928. The National Railways of Mexico completed three short extensions, totaling 18 miles, while construction was prosecuted on three major projects: the Mexico-Tampico Short line, 333 miles; a line from Tampico to Vera Cruz, 313 miles, and a line from Calles to Guerrero, 78 miles. In addition, two new lines are being located and a number of others are projected. This road also carried on the construction of large repair shops at Monterey, N. L. during the year. The Kansas City, Mexico & Orient completed a 40-mile extension in Chihuahua which carried its line to Ojinaga on the Rio Grande at the International Boundary.

Second Track Construction

The greater part of the second track constructed during the year was built by four of the larger Western

roads, the Texas & Pacific, the Atchison, Topeka & Santa Fe, the Chicago, Burlington & Quincy, and the Oregon Short Line unit of the Union Pacific System, these lines constructing a total of 147 miles, or 54 per cent of the total. The longest continuous stretch was built by the Sante Fe on its main line in Arizona, between Chambers and Carrizo, 34 miles. The Texas & Pacific constructed a total of 59 miles at several points on its main line in Louisiana and Texas, and the Oregon Short Line built 21 miles on its main line in Idaho. The Burlington's addition to its second-track mileage, 29.4 miles, was made at several points on its line along the Mississippi river, between Savanna, Ill., and St. Paul, Minn., and these, with the work which is now under way, will complete the double-tracking of this line of approximately 300 miles in 1929. The New York Central, by the construction of 11 miles between Middleport, N. Y., and Lockport, completed the double-tracking of its Falls Road between Rochester, N. Y. and Lockport, 56 miles.

The Great Northern's tunnel through the Cascade mountains in Washington, together with the changes in line incidental to the construction of the tunnel, will be completed and placed in service during the present month, while the new double-track Musconetcong tunnel of the Lehigh Valley in New Jersey, replacing its former single-track tunnel in the same vicinity, was completed during 1928.

Important bridge work carried on during 1928 included the completion of a three-track lift bridge over the lower Hackensack river in New Jersey by the Delaware, Lackawanna & Western, at a cost of $3,230,000, and the continuance of work on the new bridge over Newark bay, which is being built by the Pennsylvania and the Lehigh Valley. The Chesapeake & Ohio is building a new bridge over the Ohio river between Cincinnati, Ohio, and Covington, Ky., while the spans and viaduct approaches to the Louisville & Jeffersonville Bridge & Railroad Company's bridge over the Ohio river at Louisville, Ky., are being replaced by heavier construction, the work being carried on by the New York Central Lines.

The construction or enlargement of yards and engine terminals continued to demand large expenditures during 1928. The Texas & Pacific completed a large yard at Ft. Worth, Tex., while the Chicago & Northwestern added several units to its Proviso yard near Chicago, and began work on additional units. The Minneapolis, St. Paul & Sault Ste Marie started extensive revisions and additions to its Schiller yard, in the Chicago zone, while the Baltimore & Ohio, the New York Central Lines, the Pennsylvania and others of the larger roads also did considerable work in extending their yard facilities.

The North station of the Boston & Maine was placed in service late in the year. Preliminary work was carried on by the Cincinnati Union Terminal Company during the year, preparatory to beginning contract work on the new union station at Cincinnati, Ohio, in 1929. The Terminal Railroad Association of St. Louis began extensive changes and additions to the Union station at St. Louis, Mo., which will involve an expenditure of over $4,000,000, and which will increase the capacity of its train shed materially. Work continued on the Union Terminal project at Cleveland, Ohio, and the various roads which will use these facilities also carried on work necessary to adapt their properties to the new layout. Work also continued during the year on the new passenger station and terminal improvements of the New York Central at Buffalo, N. Y.

Increase in Mileage of Abandoned Lines

There was a marked increase in the mileage of lines abandoned in the United States, the total of 512 miles comparing with 282 miles in 1927, an increase of 230 miles. More than half of the mileage was accounted for in four abandonments: The Bullfrog Goldfield, 80 miles, in Nevada; the Pajaro Valley Consolidated, 40 miles, in California; a 40-mile branch of the Southern in Tennessee, and a 68-mile branch of the Pennsylvania in Ohio. The increase in the mileage of lines abandoned was offset by the increase in the mileage of new lines constructed, so that the net increase of the main-track mileage of the country was 513 miles, as compared with a net increase of 497 miles in 1927, and of 548 miles in 1926. These three years are the only ones since 1916 in which the mileage of new lines exceeded the mileage of lines abandoned.

Railway Construction in the United States in 1928

Alabama, Tennessee & Northern

First Track: Calvert, Ala., to Mobile, 30 miles.
Important Work Undertaken: Freight station and yards, Mobile, Ala., $200,000 (completed).

Alaska Railroad

Important Work Undertaken: Replacement of timber trestles with concrete pipe culverts and filling, $100,000 (completed).

Atchison, Topeka & Santa Fe System

First Track: Wilkes, Kan., to Mulvane, 6.96 miles. Beardsley, Ariz., to Griggs, 15.10 miles.
Second Track: Ponca City, Okla., to White Eagle, 4.26 miles, Chambers, Ariz., to Carrizo, 33.96 miles.
Third Track: At San Bernardino, Cal., 0.12 mile.
Important Work Undertaken: Change of line, Topeka, Kan., to Pauline (5 per cent completed). Enlargement of yard, Emporia, Kan. (45 per cent completed). Additional stock yard facilities, Emporia (10 per cent completed). Yard changes and new depot, Abilene, Kan. (completed). Extension of yard, Arkansas City, Kan. (completed). Track changes and icing dock, Ash Fork, Ariz. (completed). Relocation of main line and rearrangement of yard, Barstow, Cal. (completed).

Replacing three bridges with double-track structures, near Augusta, Kan. (completed). New bridge over Arkansas river near Mulvane, Kan. (completed). Replacing bridge No. 132-I on Oklahoma division (5 per cent completed). Renewal of bascule bridge over Middle river, on Valley division, Cal. (10 per cent completed). Renewal of Orwood River bridge, Valley division (completed). Renewal of Alhambra viaduct, Valley division (10 per cent completed). Renewal of bridge No. B-174, Los Angeles division (completed).

New reservoir, Galesburg, Ill. (60 per cent completed). Additional water facilities, Augusta, Kan. (80 per cent completed). New coaling station, Galesburg (90 per cent completed). Construction of mechanical facilities, Emporia, Kan. (75 per cent completed). New frog and switch shop, Newton, Kan. (completed). New storehouse, Richmond, Cal. (completed). Car repair shed, Richmond (completed). Office building, Wellington, Kan. (10 per cent completed).

Raising grade, Cicero Avenue subway, Chicago (60 per cent completed). New viaduct, Sixth street, Topeka, Kan. (10 per cent completed). Subway, South avenue, Ponca City, Okla. (75 per cent completed).

(Gulf, Colorado & Santa Fe) New storage yard, Saginaw, Tex. (completed). New machine shop, Cleburne, Tex. (50 per cent completed).

(Panhandle & Santa Fe) Road under construction, Pampa, Tex., to Cheyenne, Okla., 80.70 miles. Storehouse facilities, Amarillo, Tex. (completed). General office building, Amarillo (15 per cent completed).

Atlanta & West Point

Second Track: Hulsey, Ga., to Oakland, 5.24 miles.

Atlantic Coast Line

First Track: Five miles south of Immokalee, Fla., to Deep Lake, 23 miles.
Important Work Undertaken: Line under construction, Clewiston, Fla., to West bank of Miami Canal, 8 miles.

Baltimore & Ohio

First Track: Hamilton Furnace, Ohio, to Woodsdale, 3 miles. Middletown branch to South Middletown, Ohio, 2 miles.
Important Work Undertaken: Construction of five miles of branch line and reconstruction of six miles of existing branch between Hamilton Furnace, Ohio, and South Middletown, $1,500,000 (completed). Revision of line and second track, Germantown, Md., to Barnesville, $1,650,000 (completed). Revision of line and second track, Dickerson, Md., to Point of Rocks, $700,000 (completed). New terminal yard, Ohio Junction, Ohio, $1,650,000 (25 per cent completed). New terminal yard, Cincinnati, Ohio, (initial appropriation) $1,600,000 (completed). Delivery tracks, Ciucinnati, $103,000 (completed). New yard, Indianapolis, Ind., $163,000 (completed). Change of location of main line, with revision and extension of yard, Robey street, Chicago, $520,000 (80 per cent completed). Relocation of main tracks and yards, Chicago, account of straightening channel of Chicago river, $1,300,000 (40 per cent completed). New water facilities, Cumberland, Md., $160,000 (completed). New freight station and facilities, Newark, Ohio, $195,000 (completed).

Renewal of bridge, Tiffin, Ohio, $154,000 (completed). Renewal of

bridge, Lovett, Ind., $165,000 (completed). Renewal of bridge, Clay City, Ill., $133,000 (75 per cent completed). Renewal of bridge, Lebanon, Ill., $118,000 (25 per cent completed). Change of line and track elevation, South Philadelphia, Pa., $4,400,000 (62 per cent completed). Grade separation, Baltimore, Md., $1,780,000 (13 per cent completed). Grade separation, Elm Grove, W. Va., $370,000 (completed). Grade separation, Girard, Ohio, $210,000 (completed). Grade separation, Bond Hill, Ohio, $370,000 (completed).

Bartlett Western

Important Work Undertaken: Line projected, Bartlett, Tex., to Cameron, 35 miles.

Beaver, Meade & Englewood

First Track: Hooker, Okla., to Hough, 20 miles.
Important Work Undertaken: New line under survey, Hough, Okla., to Keys, 40 miles.

Bellefonte Central

Important Work Undertaken: Line under construction, Struble, Pa., to Fairbrook, 5.4 miles.

Belt Railway of Chicago

Important Work Undertaken: Track elevation between Ninety-third and Ninety-fifth streets, Chicago, from Indiana avenue to Colfax avenue, $4,675,000 (99 per cent completed).

Bessemer & Lake Erie

Important Work Undertaken: Continuing work on grading, masonry and structures for change of line, Pardoe, Pa., to Coolspring, $694,936 (completed). Completion of work on change of line, Coolspring to Filer, $1,121,600 (80 per cent completed). Grade reduction on southbound main track, Harrisville, Pa., $152,114 (completed). Widening channel between docks No. 1 and No. 4, Conneaut Harbor, Ohio, $916,600 (completed).

Big Sandy & Cumberland

Important Work Undertaken: Line under construction, Hurley, Va., to Levisa river, 14 miles, also widening to standard gage and rehabilitating line from Devon, W. Va., to Hurley, 12 miles, and from Grundy, Va., to Virginia-Kentucky state line, 13 miles, $8,000,000 (5 per cent completed).

Birmingham Southern

Important Work Undertaken: Extension of classification yard, Fairfield, Ala., $250,000 (30 per cent completed). Grade separation, Birmingham, Ala., $170,000 (projected for 1929).

Boston & Maine

Second Track: Hoosick Junction, N. Y. to Eagle Bridge, 3.54 miles. Willows Mass., to West Chelmsford, 8.65 miles.

Canadian National (U. S.)

Second Track: At Pontiac, Mich., 0.29 mile.
Important Work Undertaken: Construction of belt line, 2.5 miles, Pontiac, Mich. (completed). New outbound yard, North Detroit, Mich. (completed). Rearrangement and extension of yard, Port Huron, Mich. (completed). Grade separation from Jefferson avenue to Hale street, Detroit, Mich., and Hamtramck. Separation of grades at crossing of Michigan Central, Detroit and Hamtramck (completed). Grade separation, Pontiac, Mich. (completed). Grade separation, South Bend, Ind. Track elevation, Fifty-fifth street to Seventy-first street, Chicago.

Central Arizona

First Track: Extension from former end of line, 5 miles.

Central of Georgia

Important Work Undertaken: Tracks to coal fields, Colgate, Ala., $1,500,000 (75 per cent completed). Completion of steel and concrete viaduct, Bay street, Savannah, Ga., $500,000 (completed).

Central Railroad of New Jersey

Important Work Undertaken: Engine terminal, Bethlehem, Pa., $123,000 (completed). Grade crossing elimination, Perth Amboy, N. J., $2,200,000 (completed). Grade crossing elimination, Solomons Gap, Pa., $168,600 (completed). Grade crossing elimination, Cranford, N. J., $2,300,000 (16 per cent completed).

Chesapeake & Ohio System

First Track: Rupert, W. Va., to Duo, 12 miles.
Second Track: Gill, W. Va., to Harts, 5.48 miles.
(Hocking Valley) Langley, Ohio, to LeMoyne, 18.90 miles.
Important Work Undertaken: Industrial tracks, Covington, Va., $100,150 (completed). Engine terminal facilities, Danville, W. Va., $144,800 (completed). Engine terminal facilities and yard tracks, Martin, Ky., $207,350 (completed). New tunnel, Greenwood, Va., $352,000 (completed). Enlarging Red Hill tunnel, Callaghan, Va., $214,000 (completed). Rearrangement and extension of station, with grade separation, Prestonsburg, Ky., $151,400 (15 per cent completed). Renewal of bridges, Newport, Ky., to Covington, with grade separation through Covington, renewal of Ohio River bridge at Covington and double-tracking Cincinnati Interterminal Railroad, Cincinnati, Ohio, $11,702,400 (85 per cent completed).
(Hocking Valley) New yard, Walbridge, Ohio, $882,526 (completed).

Chicago & Alton

Important Work Undertaken: Tracks to serve strip mine near Wilmington, Ill., $195,000 (completed). Addition to elevator, Kansas City, Mo., $116,000 (8 per cent completed).

Chicago & Eastern Illinois

Important Work Undertaken: Replacing 155-ft. double-track through truss span with 3 deck-plate girders to provide increased opening, Watseka, Ill., $125,000 (completed).

Chicago & North Western

First Track: Wiscona, Wis., to connection with Lake Shore division, 2.84 miles.

Important Work Undertaken: Construction of Indiana Harbor Belt receiving yard and connection, and extension of yard No. 4, Proviso, Ill., $1,800,000 (completed). Construction of inbound hump classification yard, inbound I. H. B. yard, city departure yard and light repair yard, Proviso, $3,381,700 (50 per cent completed). Track elevation, Mayfair (Chicago), $2,500,000 (95 per cent completed). Track elevation, Peterson avenue, Chicago, $560,570 (10 per cent completed). Freight houses in connection with Merchandise Mart, Wells Street yard, Chicago, $1,338,334 (15 per cent completed). Grade separation Shorewood, Wis., $183,000 (completed). Grade separation, Madison, Wis., $100,000 (completed).

Chicago & Western Indiana

Important Work Undertaken: Construction of elevated train yard along Canal street, near Twenty-third street, Chicago, $1,650,000 (completed).

Chicago, Burlington & Quincy

Second Track: Alma, Wis., to Stockholm, 20 miles; Hager, Wis., to Diamond Bluff, 5.40 miles; Prescott, Wis., to Hastings, Minn., 4 miles.
Important Work Undertaken: Revision of passenger yard, Chicago, $1,800,000 (30 per cent completed). Engine terminal, Chicago, $269,882 (completed). Addition to elevator, Council Bluffs, Iowa, $215,000 (completed).

Chicago, Milwaukee, St. Paul & Pacific

Important Work Undertaken: Track elevation, Mayfair (Chicago), $1,500,000 (70 per cent completed). Track elevation, Evanston, Ill., $2,225,000 (15 per cent completed). Grade separation, Milwaukee, Wis., $4,000,000 (10 per cent completed).

Chicago, Rock Island & Pacific

First Track: Stinnett, Tex., to Cator, 24 miles.
Important Work Undertaken: New line under construction, Cator, Tex., to Gruver, 10 miles. Line under survey, Gruver to Liberal, Kan., 61 miles.
Rearrangement and extension of yard, Burr Oak, Ill., $175,000 (completed). New yard and facilities, Ottawa, Ill., $155,000 (completed). Additional yard facilities, East Des Moines, Iowa, $100,000 (completed). Additional yard facilities, Armourdale, Kan., $150,000 (completed). Track elevation, South Chicago, $1,200,000 (93 per cent completed). Grade revision, Illinois division, $142,500 (completed). Flood control, Southern district, $105,000 (completed).
Steel-car repair shop, Burr Oak, Ill., $410,000 (completed). Commissary and storehouse, Fifty-first street, Chicago, $375,000 (completed). Extension of platforms and canopies, La Salle Street station, Chicago, $203,000 (completed). Roadside fuel-oil stations, El Paso-Amarillo division, $177,000 (completed).
Rebuilding bridge over Fourth street, Davenport, Iowa, $116,000 (completed). Renewal of steel floor of Mississippi River bridge at Rock Island, Ill., $110,000 (completed). Rebuilding bridge over North Canadian river, Council, Okla., $148,000 (completed). Renewal of bridge over Cow creek and changing channel, $145,000 (completed). Repairs to Harahan bridge, damaged by fire, Memphis, Tenn., $200,000 (completed).

Cincinnati Union Terminal Company

Important Work Undertaken: Preliminary work for construction of passenger terminal, Cincinnati, Ohio, $40,000,000.

Colorado & Southern

First Track: Mile Post 165.71, Wyoming, to Mile Post 171.89, 6.18 miles. (Relocation of main line).
(Fort Worth & Denver City) Estelline, Tex., to Dimmitt, and Silverton, Tex., to Lubbock, 205.37 miles.
Important Work Undertaken: Reconstruction of water, air, steam, electric and other facilities at shops, Denver, Colo., $125,000 (20 per cent completed).

Delaware, Lackawanna & Western

Third Track: Boonton, N. J., to East Dover Junction, 7.75 miles.
Fourth Track: Boonton, N. J., to East Dover Junction, 7.68 miles.
Important Work Undertaken: New three-track bridge with lift span, on new location, over Hackensack river, with necessary track changes and removal of old bridge, (completed). New passenger station and facilities, together with relocation of main tracks, grade crossing elimination at Barlay and Mill streets and grading for third and fourth main tracks, Paterson, N. J., (completed).

Denver & Rio Grande Western

Second Track: At Canon City, Colo. 0.12 mile. Tennessee Pass, Colo. to Deen, 2.61 mi. At Provo, Utah, 0.64 mile.
Important Work Undertaken: Revision of alinement and rehabilitation of main line, Denver, Colo., to Ogden, Utah, $2,006,000 (completed). Rehabilitation of Salina Canon branch line, Utah, $185,000 (completed).

Detroit & Toledo Shore Line

Second Track: Vienna, Mich., to Kipf, 6.28 miles.

Detroit Terminal

Important Work Undertaken: Grade separation, Fordson, Mich., joint with Pere Marquette and municipality, $1,109,000 (completed).

Detroit, Toledo & Ironton

First Track: Malinta, Ohio, to Maumee River bridge, 6 miles.
Important Work Undertaken: Line under construction, Petersburg, Mich., to Maumee River bridge, 40 miles.

Duluth & Iron Range

First Track: Near Aurora, Minn., 1.74 miles. Near Biwabik, Minn., 1.83 miles.
Second Track: Near Aurora, Minn., 1.74 miles. Near Biwabik, Minn., 1.85 miles.

Elgin, Joliet & Eastern

Second Track: Ivanhoe, Ind., to Cavanaugh, 1.02 miles.

Erie

Important Work Undertaken: Construction of pier 21 and bulkhead

building connecting piers 20 and 21, North river, New York (completed). Float yard and bridges, gantry crane and freight house at 149th street and Harlem river, N. Y., (completed). Construction of two float bridges and 160-ton track scale, with track changes, Jersey City, N. J. (completed). Bridge over state highway, Rutherford, N. J., (35 per cent completed). Two bridges over Andrews Avenue extension, Youngstown, Ohio, (35 per cent completed). Grade crossing elimination, Watt street, Youngstown, Ohio (20 per cent completed). New freight and warehouse, Youngstown, (completed).

Florida East Coast

Important Work Undertaken: New line under construction, Belleglade-Chosen, Fla., to Lake Harbor, 9.57 miles.

Ft. Smith, Subiaco & Rock Island

First Track: At Paris, Ark., 0.66 miles.

Georgia & Florida

Important Work Undertaken: Extension from Augusta, Ga., to Greenwood, S. C., 57 miles, $3,000,000 (90 per cent completed).

Great Northern

First Track: Saco, Mont., to Hogeland, 77.41 miles. Peshastin, Wash., to Winton, 19.37 miles.

Important Work Undertaken: Cascade tunnel, 7.79 miles long between Berne, Wash., and Scenic, $10,000,000 (will be completed in January, 1929). Change of line, Peshastin, Wash., to Winton, $3,691,000 (completed). Electrification, Appleyard, Wash., to Cascade tunnel, $1,192,000 (completed). Change of line, Katka, Idaho, $334,600 (completed). New freight track, Hancock, Minn., to Morris, $194,000 (completed). Enlarging engine terminals, Fargo, N. D., $223,500 (completed). Enlarging engine terminels, Grand Forks, N. D., $700,000 (completed. New engine terminals, Blackfoot, Mont., $215,800 (completed). New engine terminals, Interbay, Wash., $423,000 (40 per cent completed). Gravel washing and crushing plant, Flint, Minn., $140,000 (20 per cent completed). Terminals, Klamath Falls, Ore., $1,119,000 (completed). Replacing one-third of ore dock with steel and concrete, Allouez, Wis., $950.000 (completed). Annex to elevator S, Superior, Wis., $700,000 (completed).

Gulf, Mobile & Northern

Important Work Undertaken: Grade revision near High Point, Miss., and Neshoba, $130,000 (completed).

Illinois Central

First Track: Edgewood, Ill., to Metropolis,, 119.90 miles, Akin Junction, Ill., to West Frankfort Junction, 6.93 miles.

Important Work Undertaken: Separation of grades at crossing of Pennsylvania, Greenup, Ill., $100,000 (completed). New passenger and freight station, Belleville, Ill., $263,610 (completed). Remodeling and enlarging passenger station, Jackson, Miss., $657,800 (completed). Addition to elevator, Omaha, Neb., $634,400 (80 per cent completed).

(St. Charles Air Line) Remodeling and removing to new foundations bascule bridge over Chicago river, Chicago, account of straightening channel of river, $500,000 (15 per cent completed).

(Chicago & Illinois Western) New freight yard, Crawford avenue, Chicago, $110,000 (completed).

Kansas City Southern

Important Work Undertaken: Line under construction, Kansas City, Mo., to Grandview, 13.24 miles. Grade reduction and grade separation, Shreveport, La., $1,024,615 (75 per cent completed).

Kansas City Terminal

Important Work Undertaken: Reconstruction of concrete deck and strengthening Main Street viaduct, Kansas City, Mo., $100,000 (completed).

Lehigh Valley

First Track: At Greensand, N. J., 0.42 mile.

Second Track: Pattenburg, N. J., to West Portal, 1.41 miles.

Third Track: Pattenburg, N. J., to West Portal, 1.41 miles.

Important Work Undertaken: New double-track tunnel south of old Musconetcong tunnel, between Pattenburg, N. J., and West Portal (completed). Installation of car retarders in yard, Coxton, Pa., (80 per cent completed). Raising New Oak Island yard in connection with bridge over Newark bay, Newark, N. J., (20 per cent completed). New 12-story warehouse, New York, N. Y., (1 per cent completed). Extension of coal pockets, Irvington, N. J., (completed). Bridge over Newark bay, Newark, N. J., (40 per cent completed). Replacing bridge over Pennsylvania Railroad, Newark, (completed). Replacing bridge over Freylinghuysen avenue, Newark, (98 per cent completed). Grade separation, Mountain Top, Pa., (completed). Renewing bridge, Aldene, N. J., (5 per cent completed).

Long Island

Important Work Undertaken: Substation for Valley Stream branch, West Hempstead, N. Y., $145,000 (completed). Electrification of yards and sidings, various divisions and branches, for electric freight operation, $1,360,580, (85 per cent completed).

Louisiana Railway & Navigation Company

Important Work Undertaken: Completion of line from Moreauville, La., to Philliptown, including bridge over Atchafalaya river, $1,200,000 (completed).

Louisville & Nashville

First Track: At Chevrolet, Ky., I mile.

Important Work Undertaken: New line under construction, Chevrolet, Ky., to Hagans, Va., 12 miles.

Rebuilding 10 bridges, Anchorage, Ky., to Shelbyville, $154,000 (10 per cent completed), Rebuilding 8 bridges, Christiansburg, Ky., to Lexington, including one on new location over Kentucky river at Frankfort, Ky., $609,000 (20 per cent completed). Grade crossing elimination, Fourth avenue, Louisville, Ky., $350,000 (completed). New yard, with coal, cinder and water facilities, Mobile, Ala., $300,000 (10 per cent completed). Shop buildings and roundhouse, Mobile, $400,000 (20 per cent completed).

Ludington & Northern

First Track: At Ludington, Mich., 0.57 mile.

Maine Central

Important Work Undertaken: New passenger and freight stations, with improved yard facilities, Ellsworth, Me., $110,000 (completed).

Meridan & Bigbee River

Important Work Undertaken: Extension of line, Cromwell, Ala., to Myrtlewood, 21 mi.

Minneapolis, St. Paul & Sault Ste. Marie

Important Work Undertaken: Relocation of 2.25 miles main track and rearrangement and extension of yard, Schiller Park, Ill., $1,325,475 (90 per cent completed). Engine terminal and facilities, Ashland, Wis., $105,400 (75 per cent completed).

Missouri-Kansas-Texas

Important Work Undertaken: Reducing curvature in main line, Rocheport, Mo., $110,000 (completed). Grade reduction, Wilsonson, Kan., $130,000 (completed). Additional yard tracks Eureka (Houston), Tex., $160,000 (completed). Rearrangement and improvement of locomotive terminal facilities, Smithville, Tex., $290,000 (40 per cent completed).

Missouri Pacific System

First Track: At Helena, Ark., 0.28 miles. At Wichita, Kan., 0.15 mile. At Kansas City, Mo., 0.19 mile.

(San Benito & Rio Grande Valley) San Benito, Tex., easterly, 18 miles. San Fernando, Tex., easterly, 6.5 miles. La Paloma, southerly, 6 miles.

Second Track: Boles, Mo., to Washington, 2.67 miles. Berger, Mo., to Gasconade, 7.83 miles. Isabell, Mo., to Osage, 4.31 miles. Allenton, Mo., to Pacific, 4.35 miles. At Valley Junction, Ill., 0.08 mile.

Third Track: At St. Louis, Mo., 0.20 mile.

Important Work Undertaken: Construction of coal spur, Pinckneyville, Ill., $107,375 (completed). New yard, Leeds, Mo., $198,000 (completed). Raising track and bridges and applying riprap for flood protection, M. & O. Crossing, Ill., to Gale, $245,620 (completed). Raising track and bridges and applying riprap for flood protection, various points on Central Kansas and Colorado divisions, $475,000 (completed). Raising track and bridges, various locations, Arkansas division and changing location main track at Benton, Ark., $1,138,200 (completed.)

Construction of approaches, bridge at Parkin, Ark., $138,000 (completed). Reconstruction of bridge, Medina, Ark., $148,000 (50 per cent completed). New bridge over Arkansas river, Little Rock, Ark., $1,568,500 (70 per cent completed).

New office building, St. Louis, Mo., $3,000,000 (completed). New union station Texarkana, Ark., $495,000 (45 per cent completed). New stock feeding facilities, Dodson, Mo., $495,000 (completed). Installation of four 400-hp. water-tube boilers, Sedalia, Mo., $128,770 (completed).

(International-Great Northern) Construction of spur to cement plant near San Antonio, Tex., 3.5 miles, $109,000 (completed). New warehouse and tracks, Houston, Tex., $120,000 (completed). Subway under Navigation boulevard, Houston, $117,000 (completed).

Mobile & Ohio

Important Work Undertaken: Grade reduction and line revision in Illinois, $198,000 (completed).

Monongahela

Important Work Undertaken: Passenger station and office building, Brownsville, Pa., $450,000 (completed).

(Chartiers Southern) Extension from Waynesburg, Pa., to Mather, 7 miles (30 per cent completed).

Mound City & Eastern

Important Work Undertaken: New line under construction, Mound City, S. D., to Leola, 70 miles.

Nashville, Chattanooga & St. Louis

Important Work Undertaken: Completion of new tunnel near Tunnel Hill, Ga., $495,000 (completed).

Important Work Projected: Construction of two-story brick building over tracks, new butterfly sheds and trackage at passenger station, Atlanta, Ga., $350,000.

New York Central Lines

Second Track: Middleport, N. Y., to Lockport, 11 miles. Gardenville branch to West Shore, near Buffalo, N. Y., 2 miles.

(Cleveland, Cincinnati, Chicago & St. Louis) Kenton, Ohio, to Sands, 1.35 miles. Colfax, Ind., to Clarks Hill, 4.92 miles.

Third Track: Garrison, N. Y., to Beacon, 9.50 miles.

(West Shore) West Englewood, N. J., to Dumont, 3 miles.

Fourth Track: Garrison, N. Y., to Beacon, 9.50 miles.

(West Shore) West Englewood, N. J., to Dumont, 3 miles.

Important Work Undertaken: Completion of terminal facilities and office building, Lexington avenue, New York, $1,673,000 (completed). New ticket-office facilities, Grand Central Terminal, New York, $252,000 (completed). Rotary equipment and lighting battery, substation 1-B, Grand Central Terminal, $607,000 (completed). Removal of express facilities and converting platforms to passenger use, Grand Central Terminal, $140,000 (40 per cent completed). Passageway, N. Y. C. building to terminal concourse, $144,000 (35 per cent completed). Widening roadways, Park avenue, 57th street to 72nd street, New York, $201,000 (completed). Elimination of grade crossings between St. Clair place and 138th street, $3,250,000 (85 per cent completed). Extension of station platforms, New York metropolitan district, $670,000 (75 per cent completed). Electrification of 30th street branch, Spuyten Duyvil to 30th street, New York, $3,285,000 (95 per cent completed). Electrification of 30th street branch, Spuyten Duyvil to Harmon, $3,540,000 (85 per cent completed). Dyckman street elimination, $1,250,000 (completed). Electrification of main line, Putnam division, Sedgwick avenue to Van Cortland Junction, and Yonkers branch, $1,416,000 (99.1 per cent completed). Team yards, 41st street and 11th avenue, New York, $325,000 (completed). Yard improvements Mott Haven, N. Y., $2,786,000 (20 per cent completed). Duplicate intake tunnel at power-house, Port Morris, N. Y., $235,000 (98 per cent completed). Enlargement of power-plant and additional engine-terminal facilities, Harmon, N. Y., $3,798,000 (60 per cent completed). Additional high-tension feeder, Botanical Garden, N. Y., to Tuckahoe, and installation of rotary converter and high-tension circuit, substation No. 8, Tuchahoe, $234,000 (completed.)

Third and fourth tracks, Beacon, N. Y., to Garrison, $7,100,000 (80 per cent completed). Third and fourth tracks, West Englewood, N. J.,

to Dumont, $1,455,000 (completed). Second track, Rochester, N. Y.. to Lockport, $1,525,000 (completed). Mechanical freight handling equipment, pier No. 3, Weehawken, N. J., $115,000 (completed). Grain dryers, pier No. 7, Weehawken, $390,000 (10 per cent completed). Belt conveyor, pier No. 7, Weehawken, $120,000 (50 per cent completed). Relocating milk facilities, Weehawken, $150,000 (75 per cent completed). Reconstructing passenger ferry bridges, Weehawken, $846,000 (10 per cent completed). Reconstruction and extension of enginehouse, Renssalaer, N. Y., $600,000 (40 per cent completed). Terminal improvements, Buffalo, N. Y., $14,000,000 (85 per cent completed). Installation of car retarders, East Syracuse, N. Y., $2,000,000 (75 per cent completed). Track changes and ash conveyors, Wayneport, N. Y., $210,000 (40 per cent completed). Freighthouse, North Tonawanda, N. Y., $138,000 (completed).

Grade crossing elimination, Nepperhan, N. Y., $282,000 (50 per cent completed). Viaduct, Wakefield, N. Y., $252,000 (5 per cent completed). Grade crossing elimination, Sherrill, N. Y., $100,000 (50 per cent completed). Grade crossing elimination, Rensselaer, N. Y., $450,000 (5 per cent completed). Grade crossing elimination, Brighton, N. Y., $315,000 (25 per cent completed). Grade crossing elimination, Thendara, N. Y., $120,000 (1 per cent completed). Replacing bridges, Melrose, N. Y., $105,000 (5 per cent completed). Reconstruction of bridge abutments, Barrytown, N. Y., and Tivoli, $238,000 (completed). Replacing bridge, Clarks Mills, N. Y., $105,000 (completed). Replacing bridge, Knowlesville, N. Y., $139,000 (1 per cent completed).

(West of Buffalo) Additional main and side tracks and electrification, account of new station, East Cleveland, Ohio, $7,000,000 (10 per cent completed). Change of line and grade separation, Port Clinton, Ohio, $2,000,000 (75 per cent completed). New passenger and freight stations, with grade separation, South Bend, Ind., $8,000,000 (70 per cent completed). Extension of 14 stalls of enginehouse, Collinwood, Ohio, $245,000 (completed). Extension of 18 stalls of enginehouse, Collinwood, $387,250 (35 per cent completed). Extension of enginehouse stalls and enlargement of power-plant, Air Line Junction, Ohio, $347,000 (50 per cent completed). Extension of power-house, Root Street coach yard, Chicago, $145,000 (completed). Extension of platforms and construction of canopies, La Salle Street station, Chicago, (joint with Chicago, Rock Island & Pacific) $100,000 (80 per cent completed). Water-treating plants, Air Line Junction, Ohio, Elkhart, Ind., and Huron, Ohio, $293,000 (5 per cent completed).

Subway, Athol Springs, N. Y., $276,000 (5 per cent completed). Grade separation, Conneaut, Ohio, $415,000 (completed). Subway, Collinwood, Ohio, $253,000 (completed). Grade separation, Cleveland, Ohio, $900,000 (completed). Grade separation, Toledo, $634,000 (5 per cent completed). Grade separation, Wyandotte, Mich., $115,000 (completed). Grade separation, Detroit, Mich., $845,000 (50 per cent completed). Viaduct Indiana Harbor, Ind., $400,000 (5 per cent completed).

(Ohio Central Lines) Car dumper, bulkhead and tracks, Toledo, Ohio, $1,500,000 (50 per cent completed).

(Boston & Albany) Coal, sand and ash plant, Beacon Park, Mass., $400,000 (completed). Enginehouse and power-plant, with coal, sand and ash facilities, Worchester, Mass., $600,000 (completed). Power-plant, West Springfield, Mass., $426,500 (completed).

(Cleveland, Cincinnati, Chicago & St. Louis) Consolidation of facilities with New York, Chicago & St. Louis for use as joint track, Altamont, Ind., to LaFayette, $235,000 (projected for 1929). Revision of tracks and electrification, Cleveland, Ohio, to Berea, account new Cleveland Union terminal, $6,750,000 (25 per cent completed). Consolidation of passenger facilities with Pennsylvania, Union City, Ind., $135,000 (35 per cent completed). Receiving yard, Sharonville, Ohio, $1,241,000 (60 per cent completed). Car retarders, classification yard, Sharonville, $518,000 (5 per cent completed). Yard and engine terminal, Cincinnati, Ohio, $3,796,000 (completed). Yard and engine terminal, Anderson, Ind., $1,175,000 (completed). Extension of yard, Harrisburg, Ill., $130,000 (completed). Renewal and extension of three concrete-arch bridges, Guilford, Ind., $520,000 (5 per cent completed). Grade separation, Columbus, Ohio, $243,000 40 per cent completed).

(Michigan Central) Reconstruction of bridge, East Gary, Ind., $342,000 (20 per cent completed). Grade separation, Hamtramck, Mich., $555,169 (completed). Grade separation, Waterman avenue, Detroit, $167,345 (completed). Grade separation, Dearborn, Mich., $351,450 (completed). Grade separation, Toledo, Ohio, $290,200 (10 per cent completed). Grade separation, Ann Arbor, Mich., $150,000 (completed). Grade separation, Grand Rapids, Mich., $137,000 (completed). Grade separation, West Fort street, Detroit, Mich., $182,657 (55 per cent completed).

(Evansville, Indianapolis & Terre Haute) Relocation, 2.3 miles, to reduce distance and curvature, Washington, Ind., $214,000 (95 per cent completed).

(Louisville & Jeffersonville Bridge & Railroad) Renewal of spans, Ohio River bridge, Louisville, Ky., $3,500,000 (65 per cent completed).

(Pittsburgh & Lake Erie) New freight yard, Pittsburgh, Pa., $203,000 (10 per cent completed). Revision and extension of yard, Becks Run, Pa., $505,000 (completed). Grade crossing elimination, McKeesport, Pa., (P. & L. E. portion) $110,200 (completed). Y. M. C. A. building, Newell, Pa., $185,000 (completed).

(Indiana Harbor Belt) Grade separation, Bellewood, Ill., $696,792 (2 per cent completed).

(Chicago River & Indiana) Track elevation over 43rd. and 47th streets, Chicago, $850,000 (90 per cent completed).

(Rutland) New bridge over Winooski river, near Burlington, Vt., $227,500 (completed).

New York, Chicago & St. Louis

Important Work Undertaken: Grade separation and approach to new Union station, Cleveland, Ohio, $17,000,000 (10 per cent completed). Freight terminal, Cleveland, $7,500,000 (90 per cent completed). New yards, Cleveland, $3,000,000 (10 per cent completed).

New York, New Haven & Hartford

First Track: North of Haddam, Conn., 0.48 mile.

Important Work Undertaken: Additional tracks, Cedar Hill yard, New Haven, Conn., $110,000 (completed). Revision of terminal track layout, Springfield, Mass., $147,000 (completed). Extension of double-track for New York, Westchester & Boston. Harrison N. Y., to Rye, 2.01 miles, $1,200,000 (completed). Additional station facilities for N. Y., W. & B., Harlem River, N. Y., $400,000 (completed). Facilities for American Railway Express Co., Harlem River, $740,000 (completed). Central heating plant, Harlem River, $100,000 (50 per cent completed). Central heating plant, Boston, Mass., $590,000 (completed). Reconstruction of Back Bay station, Boston, Mass., $400,000 (25 per cent completed). Fargo street freight house, Boston, Mass., $355,000 (completed). Addition to freight house No. 12, Boston, $250,000 (25 per cent completed). Addition of seven stalls to enginehouse, Maybrook, N. Y., $121,000 (50 per cent completed). Alteration of engine-room and power-plant at shops, Readville, Mass., $263,000 (completed). Additional boiler capacity at power-plant, Cos Cob, Conn., $500,000 (completed). Extension of inspection shed, Van Nest, N. Y., $480,000 (90 per cent completed).

Norfolk & Western

Important Work Undertaken: Yard extension, Winston-Salem, N. C., $795,900 (completed). Grade crossing elimination, various points, $346,700 (completed). Grade crossing elimination, Columbus, Ohio, $4,500,000 (10 per cent completed). Grade crossing elimination, various points, $156,000 (85 per cent completed). Bridge extensions and improvements, Cincinnati district, $285,554 (completed).

(Guyandot & Tug River) Construction of line, Wharncliffe, W. Va., to Gilbert, 10.5 miles, $3,480,000 (1 per cent completed).

Northern Pacific

First Track: Glendive, Mont., to Brockway, 62.02 miles. Florence, Mont., to Hamilton, 24.51 miles.

Important Work Undertaken. Channel change, Andrews creek, Montana, $100,000 (completed). Grade separation, Superior, Wis., $113,000 (completed). Grade separation, Yakima, Wash., $160,000 (completed). Power-plant, St. Paul, Minn., $150,000 (60 per cent completed). Car shop, Laurel, Mont., $175,000 (5 per cent completed).

Northwestern Railroad of North Carolina

First Track: Camden, S. C., to South Camden, 3 miles.

Oregon, California & Eastern

First Track: Sprague River, Ore., to Ely, 26 miles.

Pennsylvania System

First Track: Fishing Creek, Pa., to Rock Run, Md., 18.48 miles. West belt, Detroit, Mich., 1.62 miles. Miscellaneous minor changes, 0.23 miles.

Second Track: At Elma, N. Y., 2.98 miles. Terre Haute, Ind., to Mackville, 1.96 miles. Miscellaneous minor changes, 0.22 miles.

Third Track: At New Castle, Pa., 0.79 mile.

Fourth Track: At Colehour Junction, Ill., 2.55 miles.

Important Work Undertaken: Little Creek line extention, Norfolk, Va., $3,115,000 (completed). Change of line, Glen Osborne, Pa., to Shields, $1,770,000 (completed). Extension of branch, Economy, Pa., to Braden, $230,000 (completed). Change of line and grade, Carnegie, Pa., $300,000 (completed). Relocation of Wheeling branch, Warwood, W. Va., $105,000 (15 per cent completed). Revision of line and grade, Griffith, Ill., $620,000 (completed). Change of line, Adenmoor, Ill., $375,000 (completed). Extension of Grogan yard, Columbus, Ohio, $790,000 (10 per cent completed). New yards, Greenville, N. J., $695,000 (80 per cent completed). Bridge and tracks to reach Potomac freight terminal, Washington, D. C., $140,000 (75 per cent completed). Spur track, Penns Grove, N. J., $154,000 (completed). Coal wharf, ash pit and engine storage tracks, South Philadelphia, Pa., $135,975 (5 per cent completed). Additional yard facilities near M. & C. Junction, Massillon, Ohio, $110,600 (30 per cent completed).

Electrification, with telegraph and telephone changes, Philadelphia to Wilmington, Del., $6,890,000 (completed). Electrification, Philadelphia to West Chester, $3,165,000 (completed). Track elevation, South Philadelphia, $4,780,000 (80 per cent completed). Overhead bridge, Philadelphia, $245,000 (completed). Undergrade bridge, Baltimore, Md., $210,000 (completed). Grade crossing elimination, Woodbury, N. J., $375,000 (5 per cent completed). Overhead bridge, Fernwood, Pa., $200,000 (completed). Reconstruction overhead bridge, Lancaster, Pa., $105,000 (completed). Widening subway, Harrisburg, Pa., $425,000 (45 per cent completed). Overhead bridge, Tullytown, Pa., $140,000 (10 per cent completed). Track elevation, Cleveland, Ohio, $2,605,000 (completed). Grade separation, Cleveland, $275,000 (60 per cent completed). Overhead bridges, Akron, Ohio, $580,000 (completed). Track elevation, Newark, Ohio, $210,000 (10 per cent completed). Grade separation, Detroit, Mich., $210,000 (completed). Grade separation, Lincoln Park, Mich., $100,000 (10 per cent completed). Reconstruction of overhead bridge, Ashtabula, Ohio, $113,066 (70 per cent completed). Track elevation, Chicago, $1,240,000 (70 per cent completed). Renewing bridge over Newark Bay, Greenville, N. J., $4,220,000 (55 per cent completed). Bridge over Philadelphia & Reading, Manayunk, Pa., $130,000 (completed). Replacing bridge, Philadelphia, $165,000 (completed).

Connection from Pennsylvania station, N. Y., to subway, $195,000 (15 per cent completed). Enlargement of facilities, Journal Square station, Jersey City, N. J., $1,180,000 (30 per cent completed). Passenger station, Lancaster, Pa., $1,290,000 (90 per cent completed). Freight station, Trenton, N. J., $1,230,000 (80 per cent completed). Warehouse, Kearney, N. J., $250,000 (completed). Warehouse, Philadelphia, $315,000 (completed). Freight and produce terminal, Pittsburgh, Pa., $3,275,000 (25 per cent completed). Modification of passenger-car shop, Wilmington, Del., $485,000 (completed). Cold storage warehouse, South Philadelphia, $1,795,000 (completed). Coal pier, South Philadelphia, ..$1,350,000 (75 per cent completed).

Pere Marquette

Second Track: (Flint Belt R. R.) McGrew, Mich., to Grand Trunk Western crossing, Flint, 3.36 miles.

Important Work Undertaken: Cold storage warehouse, Grand Rapids, Mich., $275,000 (25 per cent completed). Grade separation, Michigan avenue, Detroit, Mich., $615,000 (P. M. proportion $307,500, completed). Grade separation, Warren avenue, Detroit, $210,000 (P. M. proportion $105,000, 40 per cent completed). Grade separation, Chase road, Detroit, $140,000 (P. M. proportion $70,000, 25 per cent completed). Grade separation, Dort highway, Flint, Mich., $160,000 (P. M. proportion $96,000, 5 per cent completed).

Pittsburgh, Chartiers & Youghiogheny

Important Work Undertaken: Line under construction, Van Emman, Pa., to Eighty-four, 8.36 miles (work temporarily deferred).

Reading

First Main Track: At Harrisburg, Pa., 1.26 miles. Shippensburg, Pa., to Lurgan, 1.10 miles.

(Atlantic City Railroad) Cape May, N. J., to Cape May Point, 2.68 miles.

Second Track: Shippensburg, Pa., to Lurgan, 2.06 miles.

Important Work Undertaken: Connection between Lebanon and Steelton branches, Harrisburg, Pa., $550,000 (completed). Relocation of main track and double tracking between Shippensburg, Pa., and Lurgan, $384,000 (completed). Track to industrial plant, Bound Brook, N. J., $329,000 (completed). Change of alinement and replacement of Mainville viaduct, $2,600,000 (completed).

New passenger station, Philadelphia, Pa., $1,700,000 (20 per cent completed). Additional freight facilities, Front and Noble Streets, Philadelphia, $103,000 (completed). Changes and extensions to freight houses Nos. 1 and 3, Front and Noble streets, Philadelphia, $100,000 (50 per cent completed). Warehouse, Philadelphia, $250,000 (completed). Gantry cranes and dredging at Pier H, Port Richmond, Philadelphia, $280,000 (completed). Grain elevator, Port Richmond, $3,850,000 (completed). New freight and passenger facilities and grade separation, Souderton, Pa., $151,000 (completed). Freight facilities, Pottstown, Pa., $160,000 (com-

pleted). Passenger facilities, Pottstown, $192,000 (20 per cent completed). Concrete platforms, driveways, etc., at passenger station, Reading, Pa., $100,000 (40 per cent completed). Engine terminal facilities, Cressona, Pa., $277,000 (completed). Engine terminal facilities, Shamokin, Pa., $282,000 (completed). New pumping station and dam, Beaver Creek, Pa., $170,000 (30 per cent completed). Y. M. C. A. building, Reading, Pa., $275,000 (completed).

Grade crossing elimination, Chester branch, Philadelphia, $245,000 (95 per cent completed). Depression of tracks, Broad street to Allegheny avenue, Philadelphia, $175,000 (10 per cent completed). Grade separation, Manayunk, Pa., $4,500,000 (22 per cent completed). Grade separation, West Manayunk, Pa., $156,500 (completed). Grade separation, Fifth street, Reading, Pa., $270,000 (12 per cent completed). Grade crossing separation, Bridgeport, Pa., $300,000 (60 per cent completed). Replacing highway bridge over tracks, Wyomissing, Pa., $148,000 (80 per cent completed). Grade crossing elimination, Glenside, Pa., $323,000 (completed). Grade crossing elimination between Emaus, Pa., and Macungie, $218,000 (50 per cent completed).

Important Work Projected: Electrification of Chestnut Hill branch, Philadelphia, Pa., also Bethlehem branch to Lansdale, Pa., and New York branch to Langhorne, Pa., $20,000,000. Commercial building, Philadelphia, $3,000,000. Passenger station, Trenton Junction, N. J., $120,000. New storehouse facilities, Reading, Pa., $958,000. Grade separation, Reading, $500,000. Grade separation, Pottstown, Pa., $117,000. Fifth track, Pottstown, Pa., including grade separation, $680,000. Grade separation, West Collingswood, N. J., $193,000. Grade separation, Tuckerton, Pa., $277,000. Rebuilding bridge over Susquehanna river, Muncy, Pa., $985,000. Extension of branch, East Trenton, N. J., $200,000.

Richmond, Fredericksburg & Potomac

Important Work Undertaken: Change of line and new bridge over Powell's creek, near Cherry Hill, Va., $700,000 (75 per cent completed).

St. Louis-San Francisco

First Track: Aliceville, Ala., to Kimbrough, 93.56 miles.
(Quanah, Acme & Pacific) McBain, Tex., to Floydada, 27.78 miles.
Second Track: At Memphis, Tenn., and Yale, 1.85 miles.
Important Work Undertaken: New engine terminal, Yale, Tenn., $1,900,000 (completed).

St. Louis Southwestern

Important Work Undertaken: Raise of grade of main line, St. Francis, Ark., $155,000 (55 per cent completed). Reconstruction of bridge, Garland City, Ark., $151,000 (90 per cent completed). Grade revision, Mt. Pleasant, Tex., to Tyler, $2,072,000 (40 per cent completed).

San Luis Valley Southern

Important Work Undertaken: New line under survey, Jaroso, Colo., to Questa, N. M., 22 mi.

Seaboard Air Line

First Track: Near Oveido, Fla., 1.50 mi.

Southern Railway System

Important work Undertaken: Construction of second track, Danville, Ky., to Lexington, 35 miles, $7,162,000. Engine terminal, Macon, Ga., $953,000 (completed). Freight station, Asheville, N. C., $229,000 (completed). Freight station, Winston-Salem, N. C., $245,000 (completed). Office building, Atlanta, Ga., $767,000 (completed). Underpass at Fourth street, Louisville, Ky., $120,000.

Southern Pacific System

First Track: (Arizona & Eastern) Calva, Ariz., to Peridot, 18.52 miles.
Second Track: (Pacific Lines) Biola Junction, Cal., to Fresno, 3.68 miles. Sivert, Cal., to Bena, 2.82 miles. Araz Junction, Cal., to Yuma, Ariz., 6.12 mi.
Important Work Undertaken: (Central Pacific) Construction of new line, Klamath Falls, Ore., to Alturas, Cal., 95.4 miles.
(Pacific Lines) New yard tracks and facilities, Fresno, Cal. (completed). Industrial drill track, Sacramento, Cal. (completed). Additional yard unit, Santa Clara, Cal. (completed). Additional storage and team tracks, with subway, Los Angeles, Cal. (completed). Reconstruction of main line and additional tracks, Glendale, Cal. (completed). Enlarging and lining tunnel No. 11, Sims, Cal. (50 per cent completed). Construction of concrete retaining walls and renewal of portions of snowsheds at Smart, Cal., Eder and Andover (completed). New drill and yard tracks, Klamath, Falls, Ore. (completed).
(Nevada-California-Oregon). Widening to standard gage, Surprise Cal., to Lakeview, Ore., 45.17 miles (completed).
(Texas and Louisiana Lines) Reconstruction of yard, Houston, Tex., $135,176 (completed). Terminal facilities, Jacksonville, Tex., $183,435 (95 per cent completed). Extension of yard and construction of overhead crossing with Kansas City Southern, Shreveport, La., $335,684 (25 per cent completed). New fruit warehouse and tracks, New Orleans, La., (95 per cent completed). Reconstruction of bridge at Kurth, Tex., $101,698 (60 per cent completed).

Tennessee & North Carolina

Important Work Undertaken: Rehabilitation of line between Andrews, N. C., and Hayesville, 25 miles, $132,000 (completed)

Terminal Railroad Association of St. Louis

Second Track: Municipal bridge to Siding No. 2, Ill., 1.04 miles. Conlogue siding No. 2 to Siding No. 3, Ill., 0.95 mile. Conlogue siding No. 3 to siding No. 4, Ill., 1.09 miles.
Important Work Undertaken: Extension of Union Station, St. Louis, Mo., $3,000,000 (10 per cent completed). New express building near Union station, St. Louis, $1,000,000 (75 per cent completed). Coach cleaning and repair yard, west of Compton avenue, St. Louis, $200,000 (completed).

Texas & Pacific

First Track: (Cisco & Northeastern) Breckinridge, Tex., to Throckmorton, 37.9 miles.
(Texas-New Mexico) Monahans, Tex., to Kermit, 23.8 miles. Wink Junction, Tex., to Wink, 3.95 miles.
Second Track: Westwego, La., to Waggaman, 2.9 miles. Johnson, La., to McCall, 29.1 miles. Ft. Worth, Tex., to Lancaster Yard, 5.3 miles, Nussbaumer, Tex., to Ft. Worth, 21.2 miles.
Important Work Undertaken: New line under construction, Wink, Tex., to Texas-New Mexico state line, 10 miles. Relay terminal, Macks, Tex., $500,000 (75 per cent completed). Lancaster yard, near Ft. Worth, $4,000,000 (completed). Yard extension, Big Springs, Tex., $298,000 (completed). Fuel oil storage facilities, Big Springs, $400,000 (90 per cent completed). Bridge over Atchafalaya river, Melville, La., $2,000,000 (40 per cent completed).

Union Pacific System

First Track: Egbert, Wyo., to Creighton, 53.70 miles.
(Oregon Short Line) at Feely, Mont., 1.43 miles.
Second Track: (Oregon Short Line) Vennig, Idaho to Kimama, 4.68 miles. At Rayle, Idaho, 3.26 miles. Besslen, Idaho, to Claget, 2.79 miles. Ticeska, Idaho, to King Hill, 9.87 miles.
Important Work Undertaken: Addition to general office building, Omaha, Neb., $498,000 (40 per cent completed). New passenger station, Hastings, Neb., $145,000 (15 per cent completed). New passenger station and office building, Gering, Neb., $124,000 (90 per cent completed). New passenger station, Marysville, Kan., $138,000 (50 per cent completed). New passenger station, Abilene, Kan., $149,000 (30 per cent completed). Pipe line for water supply from Antelope Springs to Bitter Creek, Wyo., 13.3 miles, with water softener, water tank and standpipe $250,000 (completed).
(Oregon Short Line) Extension of power-house, Pocatello, Idaho, $165,000 (50 per cent completed).
(Oregon-Washington Railroad & Navigation Company) Construction of twin tunnel, 569 ft. long and lining tunnel No. 6 with concrete, near Weatherby, Ore., $113,000 (85 per cent completed). Overhead highway bridge, with rearrangement of tracks, Seattle, Wash., $255,000 (completed).
(Los Angeles & Salt Lake) New tracks to serve industrial developments, Wilmington, Cal., $431,000 (70 per cent completed). New tracks to serve industrial developments, Los Angeles, Cal., $138,000 (completed). Reinforced concrete viaduct over Los Angeles river at First street, Los Angeles (joint with Atchison, Topeka & Santa Fe., L. A. & S. L. proportion) $257,000, (90 per cent completed). Reconstruction of bridge over San Jose Creek, near Clayton, Cal., $106,000 (completed). Reconstruction of bridge over San Gabriel river, near Pico, Cal., $226,000 (75 per cent completed). Reconstruction of bridge over Rio Hondo, near Montebello, Cal., $377,000 (60 per cent completed). Enlargement to standard double-track section and lining with concrete following tunnels: No. 9, near Etna, Nev., $250,000 (30 per cent completed); No. 10, near Etna, Nev., $304,000 (completed); No. 11 near Eccles, Nev., $517,000 (completed). Construction of employees' clubhouse, with dining, sleeping and recreation facilities, Caliente, Nev., $100,000 (completed).

Virginian

Important Work Undertaken: Construction and extension of passing tracks, various locations, $240,000 (completed). Replacings timber trestles, M. P. 56.3 and 56.6 with permanent structures, $157,600 (completed). Overhead highway crossings of permanent construction, various locations, $110,000 (completed). Overhead concrete bridge, Roanoke, Va. (railroad's portion) $234,000, (completed).
Important Work Projected: New line, Itmann, W. Va., to Gilbert, 41.80 mi. (survey completed).

Wabash

Important Work Undertaken: New passenger station, Delmar avenue, St. Louis, Mo., $300,000 (30 per cent completed). Alterations to inbound freight house No. 2, St. Louis, $163,184 (90 per cent completed). New fruit auction house, St. Louis, $423,820 (completed). Track changes for new icing facilities, Oakwood, Mich., $203,694 (completed). Grade separation, Delmar avenue, St. Louis, $340,632 (completed). Grade separation, Decatur, Ill., $113,961 (completed). Grade separation, West Fort street, Detroit, Mich., $231,795 (75 per cent completed). Grade separation, Russell and Hastings streets, Detroit, $410,139 (80 per cent completed).

Waco, Beaumont, Trinity & Sabine

Important Work Undertaken: New lines under construction, Weldon Tex., to Waco, 109 miles, and Livingston, Tex., to Port Arthur, 100 miles.

Western Pacific

First Track: At Wells, Nev., 1.18 miles.
Important Work Undertaken: Connection to Oregon Short Line, Wells, Nev., 1.18 miles, $150,000 (completed).
(Sacramento Northern) Line under construction, Riverview, Cal., to south end of Holland district, 15.35 miles, $742,000 (50 per cent completed).
Lines under survey, Brack, Cal., to Boyce Road, 2.88 miles.
(Western Pacific California R. R.) San Francisco, Cal., to Redwood City, 25.12 miles. Nilegarden, Cal., to Kings River, via Fresno, 123.70 miles.
(Sacramento Northern) Holland district to Ryde, Cal., 8.34 miles.
Vace Valley connection to Vacaville line, Cal., 7.50 miles.
(San Francisco-Sacramento R. R.) Pittsburgh Branch extension, Cal., 0.88 miles.

Railway Construction in Canada

Algoma Eastern

Important Work Undertaken: Extension of coal dock, Turner, Ont., $250,000 (40 per cent completed).

Canadian National

First Track: Weyburn, Sask., to Radville, 22.8 miles. Sturgis, Sask., to Pecsane, 21 miles. Turtleford, Sask., southeasterly, 23.4 miles. Kindersley, Sask., to Glidden, 0.9 mile. Spruce Lake, Sask., westerly, 25 miles. Elk Point, Alta., easterly, 5.8 miles. Ashmont, Alta., to Bonnyville, 37.1 miles. Bretona, Alta., to Clover Bar, 9.6 miles.
(Hudson Bay Railway) Extension to Ft. Churchill, Man., 59 miles. Branch to Flin Flon mining district, Man., 87.1 miles.
Second Track: At Windsor Junction, N. S., 0.27 mile.
Important Work Undertaken: New lines under construction: Grand Mere, Que., to East Burrills, 4 miles. Willowbrook, Sask., northwesterly, 22.4 miles. Shellbrook, Sask., westerly, 49.1 miles, Turtleford, Sask., southeasterly, 13.9 miles. Kinderaley, Sask., to Glidden, 15.5 miles. Spruce Lake, Sask., westerly, 4.5 miles. Hudson Bay Junction, Sask., 20 miles. Elk Point, Alta., easterly, 13.7 miles.
(Hudson Bay Railway) Extension to Ft. Churchill, Man., 37 miles.

Sea wall and filling for rearrangement of terminal facilities, Charlottetown, P.E.I. New Yard, Niagara Falls, Ont. New Yard, Port Arthur, Ont. (completed). Loop line, Saskatoon, Sask., 6 miles, (completed). Line revision to eliminate tunnel, Kamloops division, B. C. (completed). Filling False creek, Vancouver, B. C., for future terminal facilities. Reconstruction of piers, bridge, mile 71.7 Portage division, Man. (completed). Steel bridge to replace timber trestle, mile 184.7 Melville division, Man. (completed). Steel and concrete bridge to replace timber structure, mile 87.1 Regina division, Sask. Filling approaches to bridge over Pembina river, Edson division, Alta. Filling pile trestle, mile 17.1, Kamloops division. B. C. (completed). Concrete retaining wall along Rideau canal, Ottawa, Ont. (completed). Grade separation, Toronto, Ont.

New passenger and express building for immigration facilities, Halifax, U. S. (completed). New hotel and station, Halifax, N. S. New baggage and express building, St. John, N. B. New passenger terminal, Hamilton, Ont. Storage warehouse, Winnipeg, Man. (completed). Extension of freight house, Saskatoon, Sask. (completed). New station, Edmonton, Alta., (completed). New locomotive erecting shop, machine-shop and power-house, Montreal, Que. Alterations and additions to power-plant, Ottawa, Ont. (completed). Extension to Chateau Laurier, Ottawa, Ont. Additional guest rooms and landscaping grounds, Jasepr Park Lodge, Jasper Park, Alta. New hotel, Vancouver, B. C.

Canadian Pacific

First Track: Asquith, Sask., northwesterly, 29.8 miles. Lanigan, Sask., northeasterly, 17.8 miles. Moose Jaw, Sask., southwesterly, 38.6 miles. Rosetown, Sask., to Perdue, 35 miles. Foam Lake, Sask., southerly, 25 miles. Aikins, Sask., northerly, 20 miles. Archive, Sask., to Wymark, 12 miles. Fife Lake, Sask., 20 miles. Hatton, Sask., northeasterly, 18 miles. Leader, Sask., southeasterly 24 miles. Gem Spur, Alta., 5.9 miles. Langdon, Alta., northerly 26.2 miles. Rosemary, Alta., northerly, 30 miles. Swift Current, Alta., northwesterly, 68.5 miles. Woolford, Alta., southeasterly, 8 miles.

Important Work Undertaken: New lines under construction: Rosetown, Sask., to Perdue, 10 miles; Unwin, Sask., westerly, 20 miles; Lloydminster, Sask., northeasterly, 10 miles; Woolford, Alta., southeasterly, 5 miles; Lacombe & Northwestern, Alta., 20 miles.

Construction of third track, Montreal, Que., $430,000 (50 per cent completed). Storage tracks, Cascade subdivision, B. C., $190,000 (completed). Strengthening bridges, Oshawa, Ont., $455,000 (completed). Strengthening bridges, Toronto terminals, $371,000 (completed). Strengthening bridge, Aldersyde, Alta., $219,000 (completed). Strengthening bridges, Mountain subdivision, B. C., $1,591,000 (50 per cent completed). Extension of shops, Winnipeg, Man., $559,000 (75 per cent completed).

Edmonton, Dunvegan & British Columbia

First Track: Wembley, Alta., to Hythe, 23.6 miles.
(Central Canada) Whitelaw, Alta., to Fairview, 13.2 miles.

Michigan Central

Important Work Undertaken: Strengthening bridge, Cornell, Ont., $137,200 (completed).

Newfoundland Railway

Important Work Undertaken: Relocation of main line from Gaff Topsail, N. F., via Hinds Junction, 30 miles, $1,250,000.

Temiskaming & Northern Ontario

First Track: Mile 82, Ont., to Coral Rapids, 15 mi.
(Nipissing Central) Rouyn, Que., to Noranda, 1.3 mi.

Toronto, Hamilton & Buffalo

Important Work Undertaken: Grading for second track between Stoney Creek, Ont. and Lees Mountain Road, $272,000 (81 per cent completed). Coal handling facilities and grade reduction, south dock, Port Maitland, Ont. $457,000 (completed). North coal docks, tracks and other facilities, Port Maitland, $249,000 (96 per cent completed).

Railway Construction in Mexico

Kansas City, Mexico & Orient

First Track: Kilometer 199, Chih., to Ojinaga, 40 miles.

Mexicali & Gulf

Important Work Undertaken: Extension from present end of line, 21 miles.

National Railways of Mexico

First Track: Agua Buena, to Presa Molino de Caballeros, 8.14 miles. Adrian, Chih., to San Francisco del Oro, 7.39 miles. Kilometer B-516 to Villa de Pozos, 2.48 miles.

Important Work Undertaken: New lines under construction: Mexico-Tampico short line, 333.37 miles (8.6 per cent completed); line from Tampico to Vera Cruz, 312.8 miles (9.3 per cent completed); line from Calles to Guerrero, 78.42 miles (31.7 per cent completed). Construction of repair shops, Monterrey, N. L.

Southern Pacific of Mexico

Important Work Undertaken: Construction of steel bridge 800 ft. long, with 540 ft. trestle, replacing temporary structure over Rio Fuerte, San Blas, Sin., $450,000 (completed). Change of line and construction of tunnel, 400 ft. long between Barrancas, Jal., and Agua Fria, to replace tunnel No. 19 on original location, in which timber lining burned in May, 1928, $150,000 (50 per cent completed).

Progress Involves Problems

(*Continued from page 15*)

being provided. No material amount of freight can be handled in motor trucks by the railroads, however, until competing motor trucks are subjected to appropriate regulation that will prevent them picking and handling the select traffic under conditions of equipment and personnel not possible to the railroads.

Taxation of the railroads is becoming an increasing burden from year to year. In those states in which taxes are assessed on gross earnings a serious defect lies in the fact that the amount of gross earnings does not necessarily or invariably result in proportionately large net earnings, due to causes which may be beyond the control of the railroads.

In states where taxes are assessed upon the value of the railroad property, there is inequity in many cases where certain portions of the railroad have decreased in earning power due to competition on the highways. These light earning lines represent investments of many millions of dollars and are of substantially no value so far as earning power is concerned. With respect to physical characteristics and intrinsic value, railroad property is unlike that devoted to commercial purposes generally. Railroad property consists mainly of long narrow stretches of right-of-way of little value for any other purpose; its buildings, stations, bridges, etc., are not adaptable for any other uses. Taxation upon the value of such property, which has but little if any earning power, is unfair, particularly when it is considered that the states construct and maintain the very highways the use of which by other forms of transportation, has taken away the railroad's revenues.

A more equitable system of taxation is the so-called "gross-net" plan which has recently been adopted by the state of Maine. This plan retains all the principles of the straight gross earnings plan, but provides in place of the present flat rate a varying tax rate dependent upon the percentage of net railway income to gross with a fixed minimum. This plan places the burden on a more equitable basis, i.e., the ability to pay, and at the same time assures the state a definite percentage of gross earnings through the minimum rate. The general advocacy of this system of railroad taxation throughout the country would go far to relieve the present inequitable situation.

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German State Railways Train Crew Quarters at Berlin

Railway Finances in 1928

Rail stocks lag behind industrials in market advance—Increase in dividends paid—Large offerings of stock

By James G. Lyne

Financial Editor, *Railway Age*

THE year 1928 was much less spectacular than its predecessor from a standpoint of railway finance. The *Railway Age* average price of 20 leading railroad stocks on December 26 stood at 127.70 (stated in dollars), compared with 121.37 a year ago—a rise during the year of only a little more than six points. At the height of the bull market the index, as reported in the *Railway Age* of December 1, reached 130.91. During the early summer it reached its low point of 115.49 (June 23).

The relatively slight change in prices during the course of the year, as reflected by these indexes, is in marked contrast with 1927, in which year the index of railway stock prices rose approximately 20 points.

While the trend in railroad stock prices in 1928 was conservative as compared with the preceding year, it was still more so when contrasted with what happened in 1928 in the case of the industrials. The Dow-Jones average price of industrial stocks rose from around 200 at the beginning of the year to 295 at the height of the bull market in November. The Dow-Jones average for railroad stocks stood at 140 at the beginning of the year, reached a high of 152 and on December 18 stood at 146.

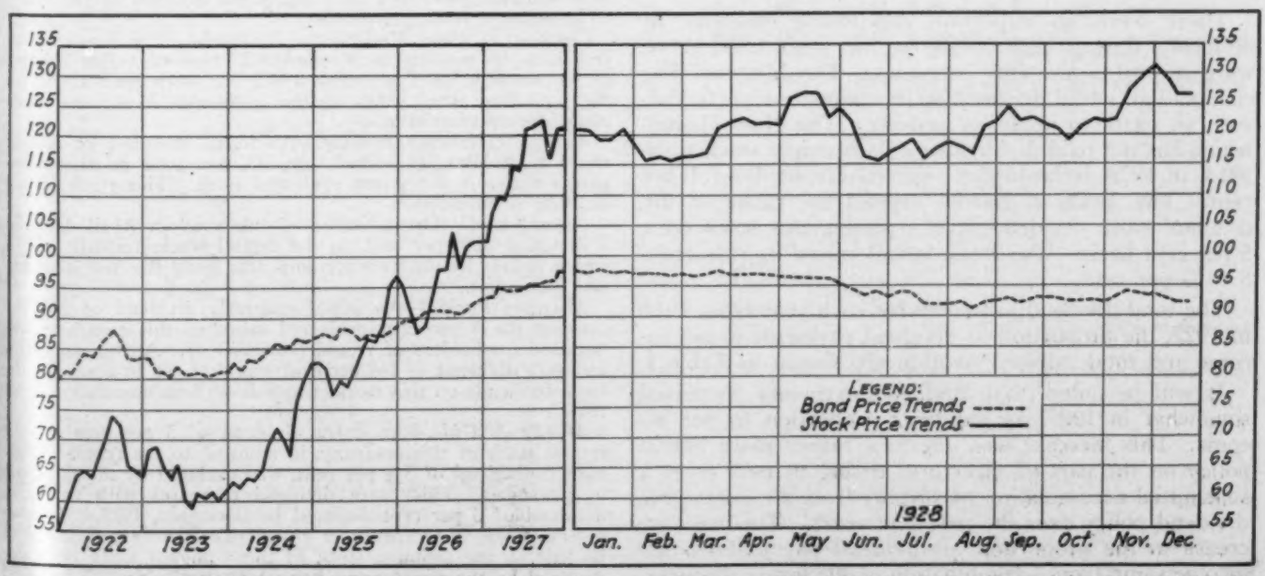
While railroad stock prices did not advance much in the active November market, neither did they suffer a bad relapse when the market swung downward. The Dow-Jones industrial stock average price was 20 points lower on December 18 than it was at the November high point, whereas the railroad stock average price on the same date was but six points lower than the highest figure it attained. Since 1921, average railroad stock prices have about doubled, while industrial stocks have quadrupled in market value.

Various reasons are assigned for the comparatively slight gains in railroad stock prices in a market which saw such tremendous advances in industrial stocks. The most likely one would appear to be that the better grade of railroad stocks offer no such opportunities for enormous profits as do some of the industrial issues. On the other hand, however, neither are they as likely to suffer severe declines as some of the industrials which have been prominent in the trading. It is perhaps significant that when the November bull market was at its height several conservative financial houses advised their customers to withdraw from the general market and at the same time suggested that there were several railroad stocks which could be safely bought.

Another factor which has undoubtedly had its effect in keeping railroad stock prices from fluctuating as violently as they did in 1927 or as industrial stocks did in 1928 has been the increasing evidence that the attitude of the Interstate Commerce Commission toward consolidation is for the time being going to be rather conservative. This belief naturally lessens speculative interest in stocks which otherwise might be in demand because of prospective consolidations.

Imminence of O'Fallon Argument

Still another factor which has fostered conservatism has been the slow but steady progress of the O'Fallon valuation and recapture case toward consideration by the United States Supreme Court. This case is set down for oral argument on January 2 and it is to be expected that the imminence of a decision in this potentially all-important case may continue to exercise a restraining influence until the decision is actually handed down.



Average Prices of 20 Leading Railway Stocks and 20 Representative Railway Bonds, 1922 to 1928

Railroad earnings also have an effect on market prices and these, for the railways as a whole during the greater part of the year, have not been such as to encourage a general advance, even though the latest total—October—at this writing indicates that 1928 earnings will exceed those of 1927 and the prospects for at least the first few months of the new year are bright.

The railways have continued to improve their financial strength by re-investing substantial portions of earnings in their properties and by reducing their proportion of bonds to total capitalization. They have continued to improve the efficiency of their service. Unregulated industries with this performance to their credit could expect a large accretion in stock values. That such has not been the experience of the railways is largely due to the fact that the prices charged for railway service are beyond managerial control and because the railroads are handicapped by regulation in meeting competition, which is in part subsidized by public funds to which the railroads, as large taxpayers, are important contributors. Should a change come which would place the railroads on even terms with competing forms of transportation or which would enable them to earn a return on their valuation comparable to that of other public service enterprises, then railroad stockholders might enjoy some of the prosperity now reserved for other industry. Regulatory policy, however, thus far has prevented the railroads from sharing to any considerable degree in the general prosperity and has diverted this share to other elements in the community—to railway patrons and to the railways' competitors.

At the same time there is an attractiveness in railroad stability which has brought the market price of some stocks to a point where their yield to the investor is about that which could be obtained from high grade bonds.

As would be expected in a time of market optimism with regard to stock issues, prices of fixed income obligations declined during the year. The *Railway Age* index of average market prices of railroad bonds which stood at 97.53 at the beginning of the year was 92.93 on December 26.

Dividend Changes in 1928

There were no important downward revisions in dividends during 1928, while on the other hand there were several noteworthy increases. The Missouri Pacific paid an initial dividend on its cumulative preferred, with an extra to apply on arrears. The New Haven, which has not paid dividends on its common stock since 1913, in 1928 declared three special dividends of 1 per cent. The Texas & Pacific entered the ranks of the common stock dividend-payers, placing this stock on a 5 per cent basis. The Rock Island raised its rate from 5 to 6 per cent.

The total dividend payments for each year from 1911 to 1927, the proportion of dividend payments to net income and total railway taxation are shown in Table I.

It will be noted that dividend payments increased somewhat in 1927, as did their proportion to net income. This increase was due to a rather more liberal policy on the part of directors, arising in part from a substantial accumulation of surplus from a conservative dividend policy over the past few years. The great increase in the proportion of dividend payments to net income came from a combination of the larger disbursements with a decline in net income of 16.5 per cent from its 1926 total.

Table I—Comparison of Dividends and Taxes, 1911 to 1927

Year Ended June 30	Dividends*	Proportion of Net Income Paid in Dividends	Taxes*
1911	$397,068,724	81	$98,626,848
1912	339,964,855	85	109,445,407
1913	322,300,406	66	118,386,859
1914	376,098,785	108	135,572,579
1915	259,809,520	82	133,276,330
1916	281,936,371	47	145,517,034
Year Ended December 31			
1916	306,176,937	47	157,113,372
1917	320,395,779	53	213,920,095
1918	275,336,547	71	223,175,379
1919	278,516,908	62.5	232,601,397
1920	271,731,669	63	272,061,453
1921	298,511,328	95	275,875,990
1922	271,573,751	73	301,034,923
1923	296,127,048	53	331,915,459
1924	320,429,767	57	340,336,686
1925	342,020,885	49	358,516,046
1926	399,243,963	49	388,922,856
1927	411,581,093	61	376,090,250

* Not including switching and terminal companies.

A list of some of the more important dividend changes in 1928 follows:

Alabama Great Southern.—In May an extra dividend of 3 per cent on both the common and preferred was declared in addition to the regular 4 per cent semi-annual dividend on both issues. Similar extra and common dividends were declared in November. The two extra dividends of 3 per cent in 1928 compare with two each of 3½ in 1927.

Atchison, Topeka & Santa Fe.—In the Annual Statistical Number of a year ago it was stated that this company was regarded as on a 10 per cent annual dividend basis in view of special dividends declared each quarter in 1927, bringing the total disbursement up to that rate. In April a 10 per cent annual rate was formally recognized when the directors raised the regular quarterly rate from 1¾ per cent to 2½ per cent.

Boston, Revere Beach & Lynn.—The quarterly dividend paid on January 2, 1928, was 1¼ per cent as compared with 1½ per cent which prevailed in the preceding four years. In March, 1928, the directors reduced the regular rate to 1 per cent, effective with the April 2 payment.

Carolina, Clinchfield & Ohio.—A quarterly dividend of $1 per share was declared to stockholders of record on March 31, instead of the regular rate of 75 cents per share which had prevailed from April, 1925. The increase to 4 per cent per annum was called for by the terms of the lease of this road.

Chicago & North Western.—An extra dividend on the common stock of ½ of one per cent was declared in addition to the regular 2 per cent semi-annual dividend at the November meeting of the board of directors.

Chicago, Rock Island & Pacific.—This company, which in 1927 initiated common dividends on a 5 per cent per annum basis, there having been no payments on this stock since the company's reorganization in 1916, early in 1928 raised its annual dividend basis to 6 per cent by the increase of the quarterly payment from 1¼ to 1½.

Chicago, St. Paul, Minneapolis & Omaha.—The board of directors at its meeting on November 13 took no action relative to the dividend of 5 per cent which had been maintained for the preceding three years on the company's 7 per cent noncumulative preferred stock.

Kansas, Oklahoma & Gulf.—An initial dividend of $3 per share to holders of record July 23 was paid on this company's Series A, 6 per cent preferred stock. This stock, issued in 1926, is cumulative.

Long Island.—The directors of this road in April declared a dividend of 4 per cent on the capital stock, virtually all of which is held by the Pennsylvania, this being the first distribution since 1896.

Missouri Pacific.—An initial quarterly dividend of 1¼ per cent on the 5 per cent preferred stock of this company was declared for holders of record December 15. At the same time an extra dividend of 1½ per cent was declared to apply on the back dividends on this stock, which have been cumulative since 1918.

Mobile & Ohio.—An extra dividend of 5 per cent on the capital stock of this company, in addition to the regular semi-annual dividend of 3½ per cent, was declared by the directors in December. This extra dividend compares with an extra dividend of 3 per cent declared in December, 1927.

New York, New Haven & Hartford.—The first dividend to be paid on the common stock of this company since 1913 was declared by the directors in February when a special dividend

of $1 was voted to all holders of record at the close of business on March 9. It was announced at that time that the special dividend did not signify any further payment, unless the directors were convinced that it was justified. In August, however, the directors again declared a special dividend of $1 to holders of record September 10 and in November a further dividend of similar amount was declared to stockholders of record December 7, making the total disbursement for the year $3.

Norfolk Southern.—A semi-annual dividend of ¾ per cent was declared payable to stockholders of record December 20. An extra dividend of 1 per cent was declared at the same time. This is the first disbursement the company has made since 1914.

Rutland.—A dividend of 1 per cent on the outstanding 7 per cent cumulative preferred stock of this company was declared for holders of record November 30. This was the first payment on this issue since a similar disbursement was made in January, 1927.

Texas & Pacific.—An initial dividend of 1¼ per cent on the common stock of this company was declared to holders of record May 31, thereby placing this stock on a 5 per cent annual basis.

West Jersey & Seashore.—The directors of this company declared a dividend of 2½ per cent to holders of record March 15, making a total of 5 per cent paid out of 1927 earnings as compared to 5½ per cent from the earnings of the preceding year. The new basis of 5 per cent was maintained when in September the semi-annual dividend was again 2½ per cent.

Wheeling & Lake Erie.—A dividend of 7 per cent on the prior lien stock of this company was declared to holders of record of October 25. This was the first payment on this stock, which was issued in the reorganization of the company in 1916. The stock is cumulative and its holders are entitled to elect a majority of the directorate while dividend payments remain as much as five years in arrears.

Railway Security Issues in 1928

The total sales of railroad securities in 1928 (first eleven months) was $746,724,000, as compared with more than $900,000,000 in the year 1927, according to the Wall Street Journal's tabulation. Of the total issues in 1928 the percentage of stock to total was 25; of bonds 64; and of equipment trust certificates 11. In 1927 stock issues were 21 percent; bonds 70; and equipment trusts 9.

Of the noteworthy stock issues those of the Pennsyl-

Table II—Partial List of Securities Issued in 1928—Stock

Road	Amount	Terms
Atchison, Topeka & Santa Fe	$18,122,400	The Interstate Commerce Commission has authorized this issue to exchange in conversion for bonds which may be offered for that purpose. An issue of $30,204,000 of 4½ per cent convertible debentures, due 1948 has been offered to stockholders, $100 bonds for each 8 shares of common stock.
New York Central	42,158,300	Sold to stockholders at par, on the basis of one new to ten previously held.
New York, Chicago & St. Louis	3,378,000	Stockholders of record March 12 were given the right to this issue of 6 per cent cumulative preferred stock at $105 and, in addition, to an issue of a similar sum of common at par; ratio one new share of common and one of preferred to each nine shares of common previously held.
Long Island	5,889,750	Capital stock, par $50, offered to stockholders of August 31 at par to the extent of 17.25 per cent of their holdings. Stock not so subscribed to be sold to the Pennsylvania at par.
Old Colony	927,400	Common stock sold at auction at not less than par.
Pennsylvania	17,500,000	Capital stock offered to employees at par.
Pennsylvania	62,408,250	Capital stock sold to stockholders of record April 14 at par, on the basis of 12½ per cent of their holdings.
St. Louis-San Francisco	49,157,400	Six per cent preferred stock sold to stockholders at par.

Bonds

Issue	Maturity	Amount	Interest Rate	Authorized for sale to Bankers at Price	Authorized for sale to Bankers at Cost Per Cent	Offered to public Price	Offered to public Yield	Offered by
Alabama Great Southern, First Mtge. Series B	1943	$5,206,000	4	97	4.62	98½	4.15	J. P. Morgan & Co., First Natl. Bank, Natl. City Co.
Atchison, Topeka & Santa Fe, Calif.-Ariz. Lines, 1st & Ref. Mtge. Series A	1962	14,691,000	4½	98½	4.588	100	4.50	Natl. City Co., Guaranty Co., Bankers Trust Co., etc.
Atlantic Coast Line, Gen. Unif. Mtge. Series A	1964	2,800,000	4½	96½	4.704	99	4.55	J. P. Morgan & Co.
Cambria & Indiana, 1st Mtge.	1968	1,800,000	4½	97	4.666	99	4.55	Drexel & Co.
Central Vermont	1930	5,000,000	4½	99.53	....	...	....	Dillon, Read & Co., White, Weld & Co., etc.
Chicago, Milwaukee & St. Paul, Gen. Mtge. Series E	1989	24,000,000	4½	100	4½	102½	4.38	Kuhn, Loeb & Co., Natl. City Co.
Cleveland, Cincinnati, Chicago & St. Louis, Ref. & Imp. Mtge., Series E	1977	15,000,000	4½	97½	4.63	100	4.50	J. P. Morgan & Co., First Natl. Bank, Natl. City Bank, Guaranty Co.
Cleveland Union Terminal, 1st sinking fund Mtge., Series C	1977	5,000,000	4½	98	....	102	4.40	J. P. Morgan & Co., First Natl. Bank, Natl. City Co.
Denver & Rio Grande Western, Ref. & Imp. Mtge., Series B	1978	12,000,000	5	93½	5.376	96	5.23	Kuhn, Loeb & Co.
Georgia, Florida & Alabama, 1st & Ref. Mtge. Series A	1952	1,750,000	6	...	....	100	6	Freeman & Co.
Kansas, Oklahoma & Gulf, First Mtge.	1978	3,951,000	5	94	5.345	98	5.10	Edw. B. Smith & Co., W. H. Newbold's Son & Co.
Lackawanna & Wyoming Valley, First Mtge.	1951	2,900,000	5	...	....	97	5.20	Taylor, Ewart & Co., Bioren & Co., S. McCreery & Co.
Lackawanna & Wyoming Valley, Debentures	1948	1,100,000	6	..	....	100	6	Taylor, Ewart & Co.
Missouri Pacific, 1st & Ref., Series G	1978	25,000,000	5	96½	5.197	99¼	5.04	Kuhn, Loeb & Co.
Nashville, Chattanooga & St. Louis, 1st Mtge., Series A	1978	16,800,000	4	94.84	4.25	97	4.14	J. P. Morgan & Co.
New York, Chicago & St. Louis, Ref. Mtge., Series C	1978	11,275,000	4½	91	4.99	94½	4.80	Guaranty Co., Lee Higginson & Co., Harris Forbes & Co., Dillon Read & Co.
North Pennsylvania (Extended)	1978	408,000	4	...	....	...	....	.....
Pennsylvania Company, Secured Mtge.	1963	50,000,000	4¾	...	....	99	4.81	Kuhn, Loeb & Co.
Pittsburgh & West Virginia, 1st Mtge. Series A	1958	3,000,000	4½	94½	4.85	96½	4.72	Brown Bros. & Co., Stone, Webster and Blodget.
St. Louis-San Francisco, Cons. Mtge. Series A	1978	100,000,000	4½	94½	4.79	97	4.65	Speyer & Co., J. & W. Seligman & Co., Guaranty Co.
Southern Pacific	1968	29,400,000	4½	97¼	4.652	99¾	4.52	Kuhn, Loeb & Co.
Terminal Railroad Assn. of St. Louis, Ref. & Imp	1978	7,000,000	4½	97	4.655	...	....	J. P. Morgan & Co.
Toledo Terminal, 1st Mtge.	1957	259,000	4½	95	4.822	...	4.75	Halsey, Stuart & Co.
Union Pacific	1968	20,000,000	4	90.5	4.515	92¾	4.38	Kuhn, Loeb & Co.
Wabash, Ref. & Gen. Mtge., Series C	1978	17,867,000	4½	93	4.875	95½	4.74	Kuhn, Loeb & Co.
Waco, Beaumont, Trinity & Sabine, 1st Mtge., Series A *	1948	3,000,000	6	89	....	...	....	George M. Forman & Co.
Wheeling & Lake Erie, Ref. Mtge., Series B	....	894,000	5	99.55	5.027	...	....	Halsey, Stuart & Co.

* Sale to Bankers conditional.

Table III—Railway Securities Sold to Public in 1916 and 1920 to 1928

	Bonds	Notes	Stock	Total R. R. financing	Total all financing	Per cent R. R. to total
1916	$229,000,000	$126,000,000	$16,000,000	$371,000,000	$1,864,000,000	19.90
1920	194,583,000	193,840,000	3,737,000	392,160,000	3,324,922,000	12.12
1921	455,125,000	202,928,300	27,222,500	685,275,800	2,780,874,000	24.64
1922	299,025,800	288,936,500	27,068,100	615,030,400	3,200,176,000	19.22
1923	165,956,000	354,720,500	59,140,850	579,817,350	3,602,704,000	16.04
1924	620,347,000	351,276,200	11,000,000	982,623,200	4,185,590,000	23.46
1925	374,020,500	151,753,740	30,934,430	556,708,670	5,234,992,000	10.63
1926	241,954,000	172,477,000	41,577,200	456,008,200	5,746,354,000	7.94
1927	686,939,500	89,184,600	210,596,900	986,721,000	7,930,641,000	12.61
*1928	479,444,000	79,911,000	187,369,100	746,724,100	7,469,790,290	10.00

*11 Months 1928

vania, New York Central and Frisco were the largest. The Pennsylvania sold $17,500,000 of its capital stock to officers and employees and $62,408,250 to stockholders. Both issues were for capital purposes. The Frisco's offering of $49,157,400 was made to its common stockholders. The issue was 6 per cent preferred and was one phase of that company's revision of its capital structure. The New York Central sold $42,158,300 of capital stock to its stockholders and the proceeds were used to retire bonds.

The Santa Fe has offered to its stockholders the right to subscribe for $30,204,000 of convertible debentures and has been authorized to issue $18,122,400 of common stock to exchange for bonds which may be offered for conversion.

I. C. C. Holds Up Large Stock Issue

One large stock issue which the year would otherwise have had to its credit was disapproved by the Interstate Commerce Commission. The commission desired the road, the Chesapeake & Ohio, to issue its stock to existing stockholders at $150 a share instead of par. The railroad has now resubmitted its case in the endeavor to secure a modification of this ruling.

The largest bond issue of the year was the Frisco's consolidated mortgage—$100,000,000. The Union Pacific, the Southern Pacific, the Pennsylvania Company, the Missouri Pacific and the Milwaukee also had issues of 20 millions or more.

Competitive Bidding Attacked

Perhaps one of the most important tendencies noted in connection with financing during the year was the apparent check in the success of competitive bidding for securities. In one instance a railroad invited bids from 60 bankers on an equipment trust issue and only three bids resulted, all of which were rejected, as the highest price offered was only 97.25. The road then sold the issue to its regular banker for 98.25. The Interstate Commerce Commission in its annual report for 1927 defends the practice of requiring competitive bids and points to a steady decrease in the spread between the cost of funds to the roads and the interest yield to the public.

Opposing this view strongly is the National Association of Owners of Railroad and Public Utility Securities, which has canvassed the bankers on the subject and issued a statement in which several arguments against the practice are set forth.

Railroads in the Hands of Receivers

The year 1928 drew to a close with but 34 railroads with 5,352 miles of line in the hands of receivers. This is fewer miles than have been operated by receivers at any time since 1911 and fewer individual companies so operated than at any time since 1907.

The big reduction in the mileage operated by receivers, of course, has resulted primarily from the reorganization of the Chicago, Milwaukee & St. Paul as the Chicago, Milwaukee, St. Paul & Pacific.

Only one road was placed in the hands of receivers during the year. This was the White River, a 19-mile line in Vermont, which was seriously damaged by the floods in November, 1927, and has since been out of operation. A receiver was appointed in March, 1928, however, funds were raised by the sale of receiver's certificates and reconstruction was begun with the expectation that it would be complete, and operation restored, toward the end of the year.

Table IV—Receiverships Established in 1928

Name of road	Mileage	Funded debt outstanding	Capital stock outstanding
White River	19	$279,000	$250,000

Table V—Foreclosure Sales in 1928

Name of road	Mileage	Funded debt outstanding	Capital stock outstanding
Baltimore, Chesapeake & Atlantic	131	$1,290,000	$2,500,000
Bloomsburg & Sullivan	20	378,500	600,000
Rio Grande Railway	26	272,750	25,000
San Luis Southern	32	327,000	1,000,000
Four companies	209	$2,268,250	

During the year a total of four companies were sold at foreclosure, the largest of these being the Baltimore, Chesapeake & Atlantic with 131 miles. The total mileage of all four companies was 209.

One road appearing on the list of those operated by

Table VI—Railroad Mileage in the Hands of Receivers

(Figures to 1927, Inclusive, from I. C. C. Statistics for Year Ended December 31, 1927. Figures for 1928 Compiled by *Railway Age*)

Year ended	Miles of road operated by receivers at close of year	Net change during the year in miles of road operated	Number of roads in charge of receivers at close of year
June 30, 1894	40,819	.....	192
1895	37,856	—2,963	169
1896	30,476	—7,380	151
1897	18,862	—11,614	128
1898	12,745	—6,117	94
1899	9,853	—2,892	71
1900	4,178	—5,675	52
1901	2,497	—1,681	45
1902	1,475	—1,022	27
1903	1,185	—290	27
1904	1,323	+138	28
1905	796	—527	26
1906	3,971	+3,175	34
1907	3,926	—45	29
1908	9,529	+5,603	52
1909	10,530	+1,001	44
1910	5,257	—5,273	39
1911	4,593	—664	39
1912	9,786	+5,193	44
1913	16,286	+6,500	49
1914	18,608	+2,322	68
1915	30,223	+11,615	85
1916	37,535	+7,130	94
Dec. 31, 1916	34,804	—*2,550	80
1917	17,376	—17,428	82
1918	19,208	+1,832	74
1919	16,590	—2,618	65
1920	16,290	—300	61
1921	13,512	—2,778	68
1922	15,259	+1,747	64
1923	12,623	—2,636	64
1924	8,105	—4,518	61
1925	18,687	+10,582	53
1926	17,632	—1,055	45
1927	16,752	—880	40
1928	5,352	—11,400	34

* Represents decrease for six months.

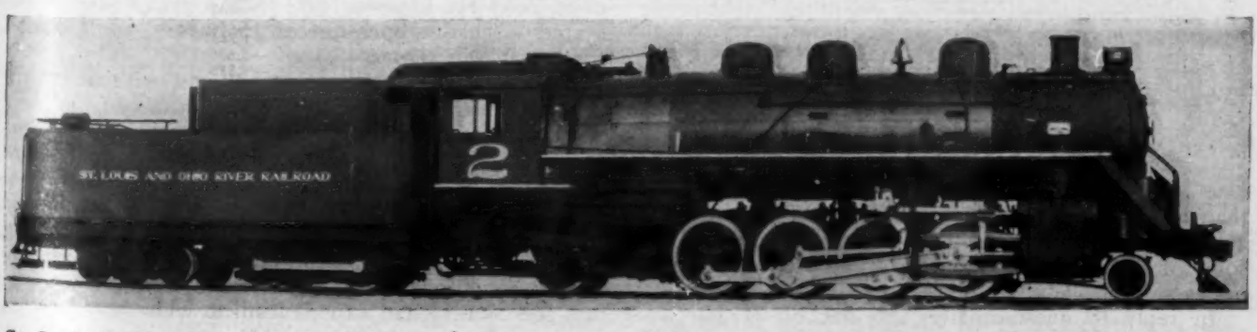
Table VII—Railroads in the Hands of Receivers on December 31, 1928

Road	Mileage operated	Mileage owned	Date of receivership	Funded debt outstanding	Capital stock outstanding	Total old company securities	Remarks
Alabama, Florida & Gulf	32	32	June 3, 1924	None	$50,000	$50,000	
Atlantic & Yadkin	163	163	Mar. 24, 1924	$1,500,000	1,000,000	2,500,000	
Bridgton & Saco River	21	21	Oct. 1, 1927	170,000	102,250	272,250	
Bristol Railroad	6	6	July 16, 1926	100,000	100,000	200,000	
California & Oregon Coast	15	15	Feb. 18, 1925	528,200	350,000	903,000	
Cape Girardeau Northern	15	104	April 14, 1914	1,156,000	110,000	1,439,400	Sold at foreclosure Sept. 12, 1927. 10 miles of line sold to Mo. P. Other portions of line being junked.
Caro Northern	17	17	July 23, 1919	.....	.....	.....	
Carrollton & Worthville	10	10	Oct. 27, 1926	95,000	20,000	129,479	
Central Vermont	493	267	Dec. 12, 1927	13,194,165	3,000,000	40,443,085	Subsidiary of Canadian National.
Chicago & Alton	1,029	691	Aug. 30, 1922	84,184,000	39,955,500	128,387,200	
Delaware & Northern	38	38	Mar. 16, 1921	None	1,250,000	1,280,856	
Eastern Kentucky	13	13	Mar. 31, 1919	None	3,455,900	3,455,900	
Gainesville & Northwestern	37	35	Dec. 8, 1923	75,000	750,000	850,000	
Gainesville Midland	74	72	Feb. 15, 1921	949,285	550,000	1,549,285	Foreclosed and purchased by security holders Mar. 2, 1926; still operated by receivers.
Gulf, Texas & Western	130	99	Jan. 24, 1921	2,000,000	500,000	2,500,000	
Kansas & Oklahoma	19	19	Apr. 17, 1923	None	288,900	288,900	
Minneapolis & St. Louis	1,628	1,514	July 26, 1923	41,359,051	25,792,600	70,603,376	
Missouri & North Arkansas	365	335	May 5, 1927	3,500,000	3,000,000	6,735,000	
Nevada Copper Belt	41	41	Apr. 2, 1925	622,000	.....	622,000	
North & South	41	41	Aug. 1, 1924	None	None	None	Court order judgments $4,280,000.
Ohio & Kentucky	40	38	Dec. 2, 1925	447,775	300,000	752,775	
Paris & Mt. Pleasant	51	51	Feb. 26, 1920	600,000	75,000	765,000	
Pine Bluff & Northern	8	8	Feb. 14, 1916	None	160,000	160,000	
Pittsburg, Shawmut and Northern	199	178	Aug. 1, 1905	14,655,600	15,000,000	31,377,950	
Sandy River & Rangeley Lakes	97	97	July 8, 1923	837,000	340,000	1,177,000	
Savannah & Atlanta	147	147	Mar. 4, 1921	3,365,000	2,250,000	6,393,622	
Sharpsville Railroad	21	21	Jan. 21, 1897	None	350,000	350,000	
Tallulah Falls Railway	57	57	June 24, 1923	1,519,000	323,400	1,857,400	
Trinity & Brazos Valley	367	303	June 16, 1914	8,760,000	304,000	10,577,851	
Virginia Southern	8	8	May 3, 1926	75,000	25,000	100,000	
White River	19	19	May 31, 1928	279,000	250,000	529,000	$160,000 Receivers Certificates authorized by Court.
Wichita Northwestern	100	100	Nov. 10, 1922	381,750	1,690,000	2,121,750	
Winchester & Western	40	40	June 21, 1926	600,000	350,000	950,000	
Winifrede Railroad	11	11	Mar. 15, 1927	None	150,000	150,000	

Table VIII—Summary of Railroad Receiverships and Foreclosure Sales, 1876 to 1927

Year	Roads Placed in Receivership: Number of roads	Miles	Bonds and stocks	Summary of Foreclosure Sales: Number of roads	Miles	Bonds and stocks
1876	42	6,662	$467,000,000	30	3,840	$217,848,000
1877	38	3,637	220,294,000	54	3,875	198,984,000
1878	27	2,320	92,385,000	48	3,906	311,631,000
1879	12	1,102	39,367,000	65	4,909	243,288,000
1880	13	885	140,265,000	31	3,775	263,882,000
1881	5	110	3,742,000	29	2,617	137,923,000
1882	12	912	39,074,000	16	867	65,426,000
1883	11	1,990	108,470,000	18	1,354	47,100,000
1884	37	11,038	714,755,000	15	710	23,504,000
1885	44	8,836	385,460,000	22	3,156	278,394,000
1886	13	1,799	70,346,000	45	7,687	374,109,000
1887	9	1,046	90,318,000	31	5,478	328,181,000
1888	22	3,270	186,814,000	19	1,596	64,555,000
1889	22	3,803	99,664,000	25	2,930	137,815,000
1890	26	2,963	105,007,000	29	3,825	182,495,000
1891	26	2,159	84,479,000	21	3,223	169,069,000
1892	36	10,508	357,692,000	28	1,922	95,898,000
1893	74	29,340	1,781,046,000	25	1,613	79,924,000
1894	38	7,025	395,791,000	42	5,643	318,999,000
1895	31	4,089	369,075,000	52	12,831	761,791,000
1896	34	5,441	275,597,000	58	13,730	1,150,377,000
1897	18	1,537	92,909,000	42	6,675	517,680,000
1898	18	2,069	138,701,000	47	6,054	252,910,000
1899	10	1,019	52,285,000	32	4,294	267,534,000
1900	16	1,165	78,234,000	24	3,477	190,374,000
1901	4	73	1,627,000	17	1,139	85,808,000
1902	5	278	5,835,000	20	693	39,788,000
1903	9	229	18,823,000	13	555	15,885,000
1904	8	744	36,069,000	13	524	28,266,000
1905	10	3,593	176,321,000	6	679	20,307,000
1906	6	204	55,042,000	8	262	10,400,000
1907	7	317	13,585,000	6	114	13,777,000
1908	24	8,009	596,359,000	3	138	2,547,000
1909	5	859	78,095,000	12	2,629	250,033,000
1910	7	735	51,427,500	17	1,100	93,660,109
1911	5	2,606	210,606,882	13	1,386	40,741,543
1912	13	3,784	182,112,497	12	661	25,910,990
1913	17	9,020	477,780,820	6	1,159	86,163,850
1914	22	4,222	199,571,446	9	1,470	83,189,500
1915	12	20,143	1,070,808,628	11	3,914	285,258,782
1916	9	4,439	208,159,689	26	8,355	703,444,855
1917	19	2,486	61,169,962	20	10,963	557,846,348
1918	8	3,519	242,090,800	11	763	24,735,187
1919	7	244	11,886,779	8	459	15,479,587
1920	10	541	21,620,150	7	380	7,676,200
1921	14	1,744	63,872,113	11	4,173	306,123,942
1922	12	4,330	329,114,860	15	6,151	299,491,646
1923	10	2,218	87,913,581	8	637	14,622,900
1924	11	920	30,223,372	14	3,992	269,251,082
1925	6	11,368	680,422,080	6	638	9,965,000
1926	6	88	2,821,400	12	12,852	626,662,708
1927	6	924	45,236,674	5	142	4,254,000
1928	1	19	529,000	4	209	6,393,250

receivers, the Gainesville Midland, was foreclosed and sold to a committee of security holders in 1926. A sale was negotiated with the Seaboard Air Line in 1928 but this sale was not approved by the Interstate Commerce Commission. The receivers, therefore, are continuing to operate the property,



St. Louis & Ohio River 2-8-2 Type Locomotive Built by the American Locomotive Company—Engine Tractive Force, 52,200 lb.—Tractive Force, with Auxiliary Locomotive, 65,100 lb.

The Lumber Yard of the Great Northern at Great Falls, Montana

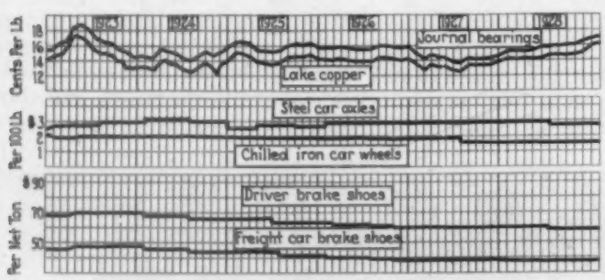
Railway Material and Supply Costs Steady in 1928

Fuel cheaper, lumber higher, metals mixed—Substantially higher prices in 1929 unlikely

By D. A. Steel

Purchases and Stores Department Editor, *Railway Age*

THERE is a feeling abroad at this time that material prices averaged higher in 1928 than in the previous year. It is difficult, however, to accept that estimate of the last year's material market. Prices were not as stationary as before and there were noticeable advances, particularly last fall, but there were also recessions. As between the two years the difference was not large, but on the whole it appears that the general average of prices paid by the railways last year was slightly lower, if anything, than for the year preceding. This condition is a repetition of the experience of former years, although to a lesser degree. With the exception of fuel, however, the general trend of prices throughout the last year was upward and the close of the year found prices of important commodities higher



Price Trends of Typical Equipment Items

than at the same period of the previous year. There are strong indications that railway purchasing will see some of the prices maintained, but substantially higher prices are not likely.

In reply to questionnaires, 16 out of 21 purchasing agents report lower fuel prices in 1928 than in 1927, 4 report the same prices and 1 higher prices. Of 18 reports on iron and steel prices, 7 indicate no change in prices, 9 increases and 1 a reduction. In 7 of 15 replies on tie prices, no change is reported, while higher prices are reported in 2 cases and lower prices in 6. Fifteen returns on lumber prices are divided as follows: No change in prices on 7 roads, higher prices on 6 and lower prices on 2. Of 14 returns on scrap prices, no change is reported from 8 roads, higher prices from 4 and lower prices from 2.

What the Buyers Think

Bearing on conditions this year, 14 out of 19 purchasing agents expect no change in fuel prices, higher prices are not looked for by any, and lower prices are anticipated by 5. Eight roads out of 16 expect no change in iron and steel prices, 7 anticipate possible increases and 1 looks for a reduction. Fourteen roads out of 19 expect no change in tie prices, 3 look for possible increases, and 2 for lower prices. Nine roads expect no change in lumber prices, 7 expect increases and none looks for lower prices. Scrap prices are not expected to change by 7 out of 15 buyers, while 8 look for possible increases.

It may be added that these returns, without exception, appraise the market situation favorably from their standpoint as buyers. Vigorous competition is evident in almost all lines of selling and the market structure appears to be free of unreasonable price levels.

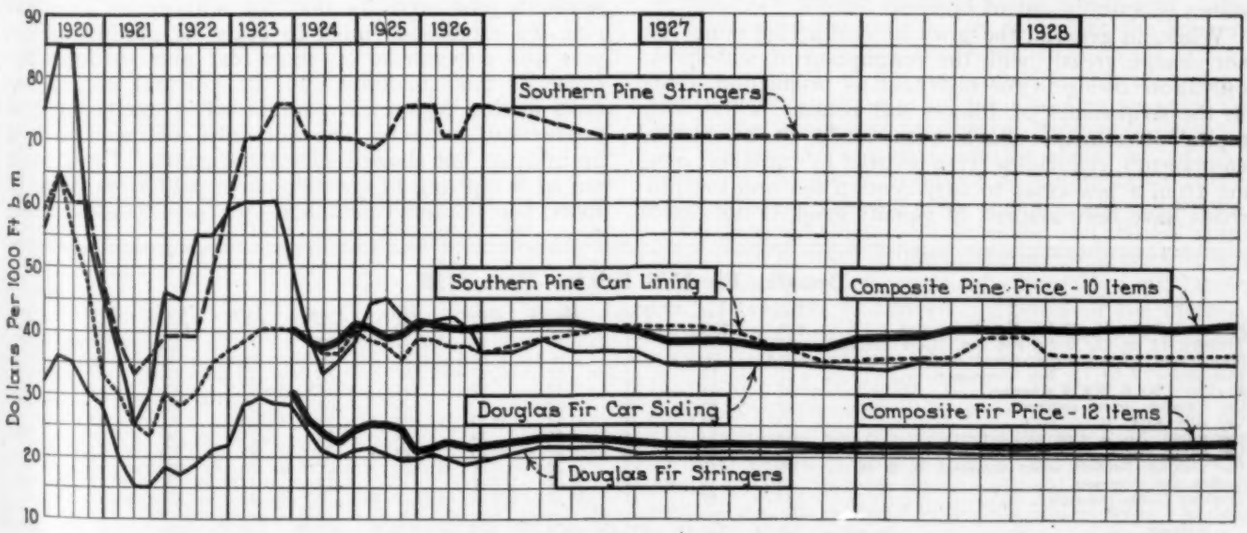
In the last 12 months the stage was set for higher prices. Peace had been declared between the warring factions in the coal fields, an era of prosperity and easy money conditions showed no visible signs of waning, and the country had experienced no wide-spread catastrophe. As a result, prices were visibly stronger at the

beginning of last year. But the spring had not passed before it became evident that business was still confronted with factors which proved a check on prices in previous periods. While the country's consuming power was large, and industries were operating on lower inventories, which kept them in the market, the policy of hand-to-mouth buying had not been departed from and the progress of industry in eliminating waste by perfecting machine operations, still left excess capacity for production.

It is probable that railway prices would have been higher if the roads had entered the market heavily. But railway buying, on a whole, was less, if anything, than it was in the previous year. The opinions expressed by representative purchasing agents on their comparative purchases prove interesting in this connection. Of 17 replies to questionnaires on fuel purchasing, 4 buyers reported no change in the amount of fuel bought as compared with the previous year, 13 reported smaller purchases, and no road reported increased purchases. Six out of 17 roads bought about the same quantity of rail, while 6 others bought more and 7 bought less. On 5 out of 17 roads approximately the same number of ties were bought as in the previous year, while larger quantities were purchased by 2 roads and fewer ties were bought by 10. Lumber purchases were stationary on 6 of these roads, larger on 4 and less on 6, while expenditures for other materials remained stationary on 8 of 16 roads, increased on 2 roads and declined on 6.

It should also be remembered in connection with railway buying that the large buying power of individual carriers places the roads in a position to get the best prices available, which are frequently below those quoted in dealer lists.

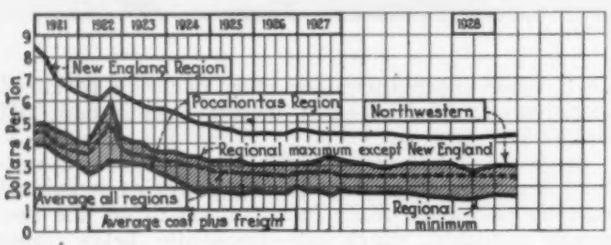
With confidence in the continuation of governmental policies favorable to business restored, the new year opens with the assurance of stable prices and the promise of advances if consumption should increase. Thus far the only threat is that found in stock speculation, which, it is feared by some, will precipitate a depression, but which the more optimistic think will adjust itself without throwing business out of line. In this connection, reference is again made to replies from representative railroads. While 6 out of 15 roads do not expect to buy more fuel next year than last and 3 roads expect to buy less, 6 others expect fuel purchases to increase; the same is true of rail. Tie purchases are not expected to increase on 9 out of 17 roads and recessions are anticipated on 6 roads, but 2 roads are buying more. Nine roads expect to buy the same quantity of lumber, 3 less and 3 more, while 13 roads expect to buy the same amount of miscellaneous materials, one to buy less and 2 expect their consumption to increase.



Mill Price Variations of Lumber Items, 1920 to 1929

Low Fuel Prices

Coal is distinctly one commodity of railway consumption for which railways have no fear of the price increasing. The coal business is in the doldrums and if it were not for the disposition of railroads and other large industries to maintain stability in the coal business, prices would probably be lower. It will be remembered that a strike was precipitated in the eastern and central coal fields in 1927. Settlements were made in Illinois and Indiana last year and these fields have made progress in regaining their former business, but Pennsylvania, Ohio, Kentucky and West Virginia went non-union. Industries, including railroads, had used up the storage coal accumulated in the previous year as a protection against strike conditions and the demand of the entire country for coal held up well, but it is not expanding, reaching a total of only 440,952,000 tons up to November 24, 1928, as against 471,320,000 tons in 1927, and the competition between the different fields, together with excess mine capacity, was too large a factor to overcome. In the western territory there is the added competition of fuel oil, the cheapness and abundance of which have led many railroads to substitute it for coal, with the result of putting many high grade mines practically out of business.



Variations in the Average Cost of Coal to Railroads from Month to Month, Freight Included, for the Various Railway Regions, as Reported to the I. C. C.

While, in general, the price of coal at the mines did not change greatly with the resumption of widespread operation, owing to the high cost of production, (even in the strip mines of Illinois and Kansas, where large capital investments have been made in mechanical equipment), reductions were secured by railways, ranging from a few cents to fifty cents a ton and the railroads have been assured of equally good, if not better, prices during the present year. Coal prices last year, as reported by 11 roads in response to a questionnaire, ranged from $1.65 to $4.31 a ton and reflected an average drop of 11 cents a ton in the 12 month's period. One of the charts shows the trend of the regional costs of coal, plus the freight charges, as reported to the Interstate Commerce Commission.

There is a large range between the cost of fuel oil to the railroads, depending upon their distance from sources, some roads paying as high as $2.20 a barrel as against 75 cents a barrel on others, but the fact is even more impressive in the case of fuel oil than with coal, that the fuel-oil using roads have been favored by overproduction in this branch of buying. Of 10 roads reporting fuel prices, there was an advance in only 2 cases while recessions of as much as 15 cents a barrel have been recorded in several instances. With the United States Shipping Board making two-to three-year contracts at prices for fuel oil delivered to seaboard and gulf ports of $0.95 to $1.00 a barrel and with a high rate of production continuing, fuel oil prices are not expected to advance during the year.

The behavior in the price of kerosene was much like that with fuel oil, as would be expected from the nature of this production. While the price for 10 roads, ranging from 5 to 15 cents a gallon, increased slightly on 4 roads, it remained uniform on an equal number of roads and was bought at slightly lower prices by the others.

Forest Products Stronger

Lumber conditions of the past year, as in previous years, reflect the rapidly diminishing supply of long leaf pine favored by south and central roads for structural purposes, the competition among different lumber producing sections, and particularly the activity of trade associations in stimulating the utilization of lumber and the securing of a better control of production to stabilize prices. It is significant of conditions in the southern pine territory that the scarcity of long leaf pine led established mills to cease its production last year and concentrate on short leaf pine cutting. Because of this condition and the effective control the mills in this region have succeeded in exercising over production, southern pine not only continued to hold up in price, but showed substantial gains. Three roads out of 6 replying to questionnaires paid from $2 to $3 more per thousand feet b.m. for pine boards at the

Douglas Fir Mill Prices—Year 1928

	Dec.*	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.
Stringers, 8 by 16, 32 ft., No. 1 common	$19	$20	$20	$20	$20	$20	$20	$20	$20	$20	$20
Timbers, 12 by 12, 32 ft., and less, No. 1 common	17	17	17	17	17	17	17	17	17	17	17
Dimensions, 2 by 6 and 8, No. 1 common	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5
Dimensions, 2 by 12, No. 1 common	17	17	17	17	17	17	17	17	17	17	17
Boards, 1 by 6, No. 1 common	17	17	17	17	17	17	17	17	17	17	17
Car framing, select common	20	20	20	20	20	20	20	20	20	20	20
Car sills, 41-45 ft.	23	24	23	23	23	23	23	23	23	23	23
Car siding, No. 2, clear and better	33	33	34	34	34	34	34	34	34	34	34
Car lining, select common, D. & M.	25	25	25	25	25	25	25	25	25	25	25
Car decking, finished, select common, D. & M.	20	20	20	20	20	20	20	20	20	20	20
Switch ties, common	17	17	17	17	17	17	17	17	17	17	17
Crossing plank, common	17	17	17	17	17	17	17	17	17	17	17
Average	$20.12	$20.29	$20.29	$20.29	$20.29	$20.29	$20.29	$20.29	$20.29	$20.29	$20.29

* 1927

Southern Pine Mill Prices—Year 1928

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Stringers, 7 by 16, 28 ft.	$70	$70	$70	$70	$70	$70	$70	$70	$70	$70	$70	$70
Bridge material, 12 by 12, 22 ft.	40	40	40	40	40	40	40	40	40	40	40	40
Car sills, 36 ft. to 40 ft.	36	36	36	36	36	36	36	36	36	36	36	36
Car lining	35	35	35	38	38	35	35	35	35	35	35	35
Car siding, 9 ft.	40	40	42	42	42	42	42	43	43	44	44	45
Planking, white oak, 3 by 10, 16 ft.	30	30	30	30	30	30	30	30	30	30	30	30
1 by 8, 14 ft.	36	36	36	38	38	38	38	38	38	38	38	38
2 by 4, 10 ft.	30	30	30	32	32	32	32	32	32	32	32	32
2 by 10, 16 ft.	35	35	35	35	35	35	35	36	36	36	37	37
Car decking, 2 in. 10 ft.	30	30	30	33	33	32	32	32	33	35	35	35
Average	$38.2	$38.2	$38.4	$39.4	$39.4	$39.2	$39.0	$39.2	$39.2	$39.4	$39.7	$39.8

close than at the beginning of the year, and, as the chart indicates, the general average of southern pine prices was upward.

It became evident by last August, that the struggles of producers of fir to control production had been attended with a fair measure of success and for almost the entire year demand exceeded production. On the whole, prices were fairly stable and many roads bought on about the same levels as in the year previous, but it is significant of the improved condition in this field that there were no recessions in prices reported by 9 roads replying to questionnaires and several roads paid from

Average Prices Paid by Railroads for Material in 1928

Material	Unit	Roads	Jan.	June	Dec.
Iron and Steel					
Axles, locomotive driving	100 lb.	12	$5.20	$5.22	$5.20
Axles, rough turned car 5 by 9	100 lb.	12	2.98	2.87	2.82
Bar iron, common	100 lb.	10	2.63	2.55	2.57
Boiler steel	100 lb.	12	1.98	2.02	2.02
Boiler tubes 2¼ in. No. 11	Ft.	12	.17	.17	.17
Bolts, machine ¾ by 6	100 pcs.	12	5.03	5.03	5.00
Brake shoes, freight	N.T.	8	43.12	38.73	38.10
Brake shoes, locomotive	N.T	11	62.62	62.36	62.00
Castings, grey iron green sand	N.T.	9	79.49	79.25	79.48
Castings, malleable 7 to 15 lb.	100 lb.	12	8.56	8.47	8.49
Castings, steel 25 to 50 lb.	100 lb.	12	7.89	7.93	8.09
Couplers, 5 by 7 by 6½	Pr.	12	38.85	38.85	38.85
Nails, wire	100 lb.	13	2.55	2.67	2.64
Pig iron, No. 1	N.T.	4	17.75	18.00	17.00
Pipe, 1 in. black steel	Ft.	11	.069	.069	.069
Pipe, cast iron, 12 in. B or C	N.T.	10	31.20	36.54	33.49
Sheet iron, black No. 28	100 lb.	10	3.06	3.03	2.90
Spring steel	100 lb.	11	2.59	2.63	2.69
Structural steel, angles	100 lb.	11	2.00	2.00	2.11
Structural steel, fabricated	100 lb.	8	3.41	3.35	3.47
Tires, locomotive, over 33 in.	100 lb.	12	6.00	6.00	6.00
Tool steel, high speed	Lb.	12	.58	.58	.58
Tie plates, steel	N.T.	12	43.12	42.25	41.91
Track bolts	100 lb.	12	3.88	3.84	3.79
Track chisels	100 lb.	12	1.77	1.78	1.74
Track spikes	100 lb.	12	2.76	2.77	2.74
Miscellaneous Materials					
Bond wire, 48 in. copper clad	100 lb.	5	18.38	17.04	17.09
Copper, soft sheet	Lb.	9	.226	.228	.240
Copper tubing ⅜	Lb.	10	.275	.275	.282
Copper wire, No. 9 bare	Lb.	10	.164	.167	.172
Copper wire, No. 10—3 lb. weather	Lb.	11	.191	.199	.202
Journal bearings	Lb.	8	.154	.158	.164
Pig lead	100 lb.	10	6.48	6.35	6.48
Fire brick	Per M	11	43.03	43.07	43.16
Boiler lagging	Sq. Ft.	11	.21	.22	.22
Glass, 24 by 24 dsa.	Box	12	4.91	4.83	5.56
Car oil	Gal.	10	.159	.159	.155
Grease, driving	Lb.	10	.121	.123	.122
Waste, colored cotton	Lb.	12	.093	.092	.088
Linseed oil, boiled	Lb.	11	.094	.091	.094
White lead in oil	Lb.	12	.102	.102	.152
Rubber, 3/32 sheet packing	Lb.	9	.28	.28	.28
Hose, 1½ air brake	Ft.	11	.48	.46	.44
Leather belting, 6 in. double	Ft.	11	1.26	1.40	1.41
Rope, manila ¾ in.	Lb.	12	.202	.196	.200
Rope, wire ¾ in. 6 strand	Ft.	11	.119	.119	.120
Fence, 26 in. woven wire	Rod	10	.488	.488	.489
Pipe, vitrified clay, 24 in.	Ft.	8	.969	.94	.94
Track shovels, No. 2	Doz.	12	13.85	13.83	13.79
Oxygen	100 cu. ft.	12	1.04	1.04	1.04
Creosote oil	Gal.	8	.143	.141	.135
Soda ash	100 lb.	11	1.40	1.40	1.40
Lime, hydrated	N.T.	11	12.20	11.96	11.81
Cement	Bbl.	12	1.88	1.84	1.84
Fuel					
Coal, bituminous	N.T.	11	2.71	2.66	2.62
Fuel oil	Bbl.	12	1.63	1.56	1.50
Kerosene	Gal.	12	.096	.086	.088
Forest Products					
Boards, fir, 1 in. by 6 No. 1 Com. R.	M Ft.	9	23.69	24.41	24.83
Boards, pine, 2 in. by 4 in. S. 4 S.	M Ft.	7	29.42	30.00	30.57
Car sills, fir 6 by 10 by 40	M Ft.	8	31.33	31.43	32.31
Stringers, fir bridge, 8 by 16 by 28	M Ft.	10	28.75	29.00	29.70
Ties, fir cross 7 by 8 by 8	Ea.	7	.69	.69	.69
Ties, pine cross 7 by 8 by 8	Ea.	7	.89	.89	.89
Ties, white oak cross	Ea.	9	1.07	1.07	1.09
Scrap Iron					
No. 1 railroad wrought	N.T.	9	11.51	10.55	12.13
No. 1 heavy melting steel	N.T.	12	11.05	10.70	12.28
Rails for re-rolling	N.T.	10	12.50	12.26	14.00

Note.—Figures give prices less trade discount. No deductions for freight to line where prices are so quoted. Recommended as indexes of trends only.

$0.50 to $5.00 a thousand more for fir lumber as the year advanced. Considering the short notice on which many roads continue to buy their lumber and the present rate at which railroads are entering their orders for cars, it is entirely probable that the higher prices of lumber reached last fall will be continued, if not advanced, during the early months of this year.

The Tie Market

During 1928 eight roads replying to a questionnaire paid from $0.45 to $1.23 for fir ties, delivered to line. Six roads paid from $0.67 to $1.20 for pine ties and 8 paid from $0.75 to $1.05 for white oak ties. Fourteen out of 19 prices continued the same throughout the year, an advance being reported in 1 instance and reductions in 3 instances. Territorial conditions are controlling influences in tie purchasing and the variety of these conditions make general discussion of the subject difficult. It is well known that many railroads have little competition in their respective fields in buying ties and virtually control production by raising or lowering the price at will, while others negotiate long contracts with producers over extended periods. Reports from all localities heard from, however, indicate that tie conditions for the past year were favorable and production ample, particularly in the southern hardwood field where poor markets for lumber forced owners to convert a heavy percentage of their cuttings into cross ties.

The failure of some buyers to uphold approved specifications in negotiating their purchases is a disturbing feature in the market, but with tie consumption on the increase and the extension of preservation enlarging the field for the utilization of inferior grades of wood, neither tie production nor tie prices are expected to get out of line for some time to come.

Iron and Steel Prices

Iron and steel prices presented a mixed condition during the year, with some advances and many recessions. The year opened strong with one mill after another announcing advances of a dollar a ton, or more, over the last quoted prices of the previous year. Buyers rushed to get their orders in before the advances became effective and business swelled, with the effect of lending strength to the entire market structure, but as the summer season approached it became apparent that the market had over-shot itself. Production was high but competition was keen, and the ability of buyers to order on old specifications or to secure other concessions ultimately forced mills to announce reductions.

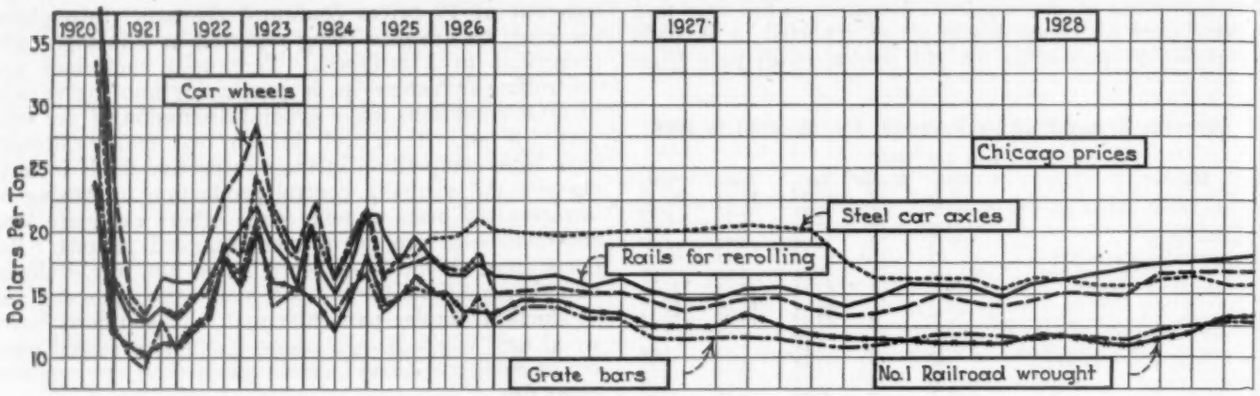
Production held up well, however, and the fall season again gave strength to the market in the form of a buying movement which continued vigorously until December. The effect of this on the prices of the materials involved was marked, giving the entire iron and steel market an upward trend for the year as compared with the downward trend of 1928. However, while the prices of such commodities as structural steel, pig iron and sheet iron were increased substantially, the prices of other products, in the face of competition and controled buying, did not do so well; this was particularly true of strictly railroad materials which were obtained in large measure at the same or lower prices than last year.

Twenty-One Prices Up—Thirty-Eight Down

This condition is revealed by the charts and by the supplementary list of prices paid by railroads last year for 67 representative items of railway materials. Many of the tabulated prices reflect quarterly, semi-annual and annual agreements, the general effect of which, of course, is to scale down the fluctuations in market quotations. It is the more significant of railway buying dur-

ing the past year, therefore, that, as compared with 23 instances out of 67 where the average of these prices paid by the different roads was higher at the close of the year than at the beginning, there were 19 instances of no change in the average and 25 instances of recessions.

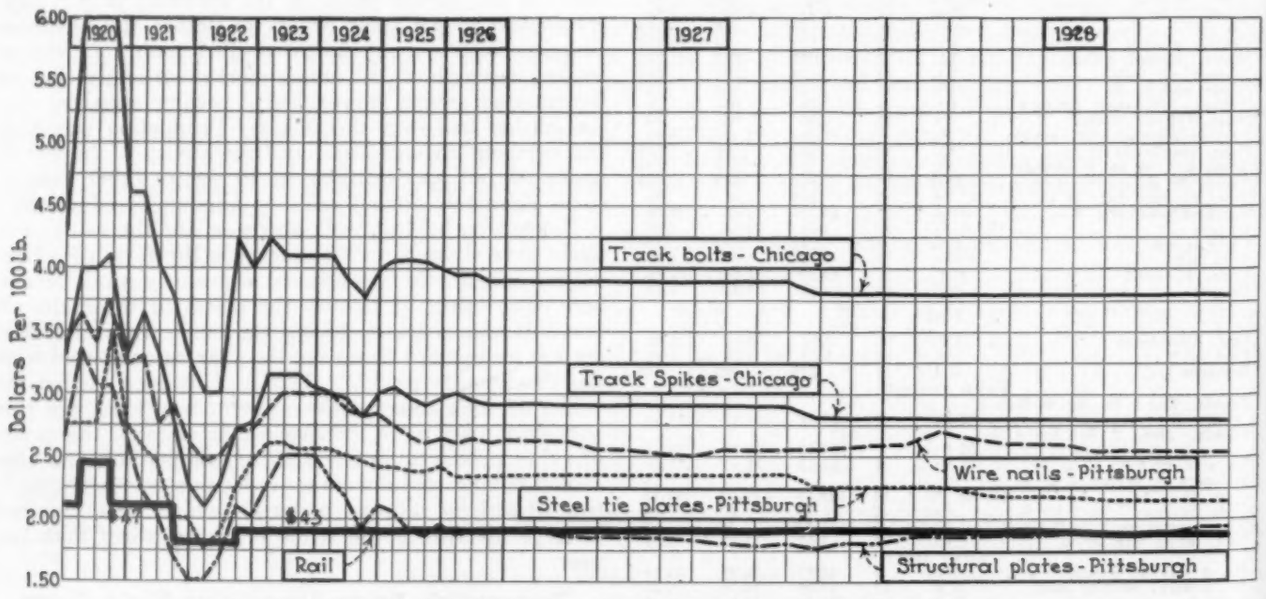
As compared with prices of the previous year, there were 8 yearly averages which reflect virtually no change from the yearly average of prices paid in 1927, 21 that were higher and 38 that were lower. Of 27 iron and steel items in the list, the average of prices paid during 1928 remained stationary throughout that year in 7 instances, was higher at the close of the year than at the beginning in 8 instances, and was lower at the close of the year than at the beginning in 12 instances. As compared with the previous year, the general yearly average of prices of the 26 iron and steel commodities showed no change from the general yearly average of prices for the previous year in 6 cases while the average was higher in 6 cases and lower in 14.



Monthly Variation in Typical Scrap Prices in the Last Nine Years

During the year changed in only two instances, an increase of 10 cents per hundred to one road being offset by a corresponding reduction on another. Car axles, ranging only from $2.62 to $4.01, were bought at the same price throughout the year on 5 roads, rose 5 cents on 1 road and dropped from 10 cents to 15 cents on 6 roads. Boiler tubes, ranging from 15.9 cents to 17 cents a foot, continued steady on all 12 roads except one which paid half-a-cent a foot more at the close of the year than at the beginning. Machine bolts remained stationary on all 12 roads, at the standard price of $5.04 a hundred pounds, whether purchased f.o.b. mill or line. Malleable castings, ranging from $4.70 to $11.00 per hundred pounds, remained stationary on all but two roads, one road paying 10 cents more with the advance of the year and the other road paying 5 cents less.

While the price of couplers did not vary on 12 roads, they cost appreciably less than the year previous. Pipe prices, which ranged from 5.9 cents to 7.6 cents a foot



Trends of Prices of Typical Iron and Steel Items Used in Roadway and Structures

The condition of these prices will appear more clearly from an examination of the prices paid by individual roads. Thus, on 12 roads, locomotive axle prices, including both f.o.b. mill and line costs, ranged from $4.40 to $7.93 and the prices paid by individual roads on 11 roads, did not vary on 5 roads, increased fractionally on 3 roads, and were reduced up to half-a-cent a foot on others. Locomotive tires, ranging from $5.60 to $6.95 a hundred pounds on 10 roads reporting, did not vary in any case and the same was true of high-

speed tool steel, which ranged from 46 cents to 85 cents a pound on the different roads.

Eight of the 12 roads buying boiler steel, which ranged from $1.63 to $2.36, paid from 5 to 10 cents a hundred pounds more at the close of the year than at the beginning, but one road got a reduction of 20 cents and a second 30 cents a hundred.

Grey iron castings ranged from $63 to $97.50 a ton on 9 roads. The prices did not vary on 6 roads, increased $2.25 a ton on 1 road but dropped an equal amount on another. Steel casting prices ranged from $7.06 to $8.29 a ton on 12 roads. These prices did not vary on 6 roads, and rose a maximum of 20 cents on the others. One of these roads that had paid a higher mid-year price, however, bought at the same price in December as in January, but the closing composite price was 20 cents higher than at the beginning. Nails, ranging only from $2.25 to $2.70 a hundred pounds on 13 roads, did not change on 8 roads, but rose on the others. On 3 of these roads, however, the last prices paid were lower than those of mid-year and the average price for all the roads shows an increase of only 10 cents a hundred over the opening prices.

Cast Pipe Up

Cast iron pipe prices, ranging from $22 to $44 a net ton on 10 roads, was substantially increased during the 12 months, advances from $3 to over $6 a ton occurring on 5 roads, although one road which was not buying under term agreement bought at the same price throughout the year and another road paid $1.50 per ton less at the close than at the beginning. The composite price for the 10 roads shows an advance of $2.40 per ton. The interesting thing about cast iron pipe is the much higher prices paid for warehouse stocks.

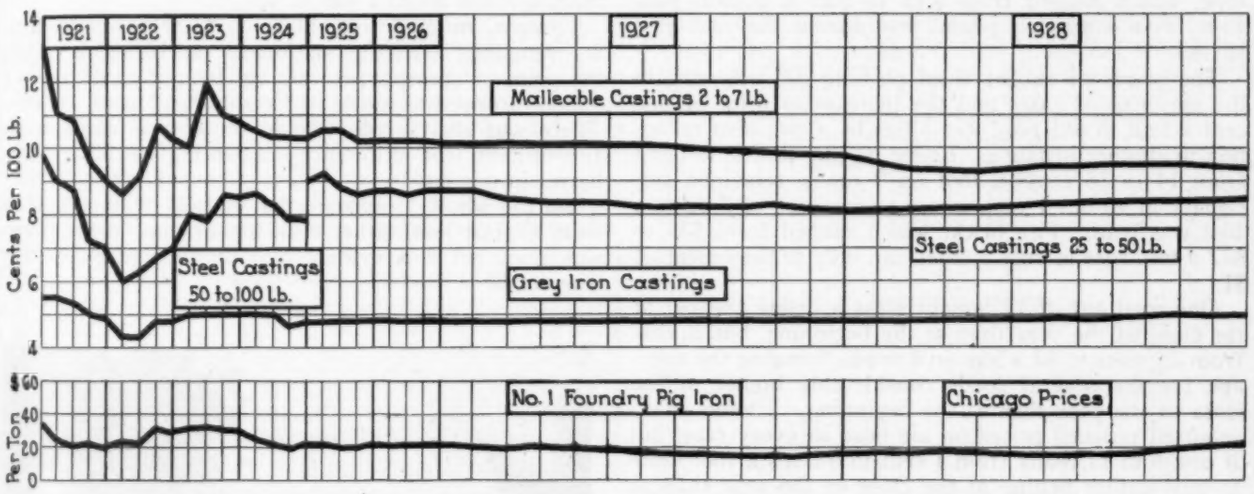
Six of 11 roads bought spring steel at the same prices throughout the year, but it rose from 10 to 25 cents a hundred pounds on 5 roads, raising the composite price at the close of the year 10 cents. Ten of 11 roads reporting structural steel angles, which ranged from $1.80 to $2.25 per hundred, paid more at the close of the year than at the beginning, the increase, however, not exceeding 15 cents. Fabricated steel also showed consistent advances during the year, although there was no change in cost to 3 out of 8 roads while the largest increase amounted only to 12 cents a hundred pounds or $2.40 a ton.

Bar iron is one of the commodities the average cost of which dropped on 10 roads during the last year. There were advances on 5 roads, but the increase in each case, not over 10 cents a hundred, was not sufficient to offset the reduction on other roads. Brake shoe costs, both locomotive and car, were less to practically every road as the year advanced, the reductions averaging $1.00 a ton. While, consistent with the record production of pig iron during the past year, one road out of the 4 paid $1 a ton more in the fall, and 2 other roads secured substantial reductions with the result that the composite of prices paid by the several roads was actually less at the close of the year than at the outset.

Tie Plates Less

Sheet iron prices were irregular, several roads paying more in mid-summer than in the spring and other roads less. While the price rose in some of these cases, it was less in every case by from 5 to 15 cents a hundred pounds at the close of the year than at the beginning. Steel tie plates were another commodity which dropped appreciably in price during the past year. None of 12 roads paid more at the close of the year than at the beginning and all but 3 paid from $1 to $3.50 less a ton. The mill prices ranged from $39.90 to $44.90 a ton, the latter reflecting copper content.

While, in general, track bolt costs remained stationary, 3 out of 12 roads paid from 10 cents to 30 cents a hundred pounds less at the close of the year than at the beginning, the prices on the different roads ranging from $3.50 to $4.35 a ton. Track chisel prices, ranging from 95 cents to $1.80 each, rose 10 cents on 2 out of 12 roads but dropped correspondingly on 2 others, while track spikes, which ranged from $2.65 to $3.05 per hundred on 12 roads, remained stationary in all but 3 cases where reductions of from 4 cents to 20 cents a hundred were reported. Track shovels, ranging from $9.85 to $16.00 a dozen, did not vary on 9 roads, advanced 48 cents on 1 and dropped from 25 to 50 cents in the remaining 2 instances, bringing the closing average slightly below that at the beginning.



Trends of Mill Prices for Various Materials Used in Car and Locomotive Work

Higher Scrap Prices

The last year was a much better one for the railroads in the scrap iron market. In this field, of course, the situation is reversed, with the railroads selling. The year 1927 closed with prices of scrap lower than they have been for several years, but the depression of the

market had not ended when 1928 began and prices of scrap dropped still further, notwithstanding the active production of steel. As the summer advanced, the demand for scrap iron increased and prices continued to rise during the remainder of the year. This revival of the scrap market is brought out in the chart. Supplementing the chart are the prices given in the table, which show substantial advances in all 3 scrap commodities considered. Only 2 roads out of 9 got less for No. I railroad scrap at the close of the year than at the beginning, the other roads getting from $1 to $2 per ton more, with individual prices ranging from $9.75 to $15.07 a ton. The prices secured for No. 1 heavy melting steel, ranging from $10.00 to $16.04 a ton at the close of the year, reflect a reduction on only one road, and the same is true of rails for re-rolling, which ranged from $11.75 at the close of the year to $16.75 on 10 roads.

Miscellaneous Articles

Nine out of 10 roads bought wire fence at the same price throughout the year, while the remaining road paid only a cent a rod more. Two of 8 roads paid less for sewer pipe as the year advanced and 1 road paid 20 cents more, while the prices, ranging from $.49 to $1.60 a foot, did not vary on the other roads. Wire rope prices continued throughout the year without change on 10 of 11 roads, while all 12 roads reporting manila rope, which ranged from $.15 to $.25 a pound, paid from 1 to 4 cents a pound less during the year just passed.

The prices of rubber sheet packing did not vary in the majority of cases and the increase in price of one cent a foot to one road was offset by a two cent reduction in another instance. Boiler lagging prices, ranging from 14 to 38 cents a foot on 9 roads, remained stationary in all but 1 case where an increase of 7 cents a foot was paid. Fire brick, which ranged from $35 to $77 a ton, rose in only 2 cases and only to the extent of $1.

One road out of 12 bought glass a dollar cheaper at the close of the year than at the beginning, but it rose from 25 cents to $2 a box on 6 roads, bringing the average for the several roads considerably higher at the close of the year than at the beginning. Eleven roads reported reduced prices on air hose in every case, but it cost 6 to 11 roads from 1 cent to 9 cents a foot more to buy leather belting at the close of the year than at the beginning. Waste, ranging from 7 cents to 13 cents a pound on 12 roads, remained stationary on 3 roads, increased a fraction of a cent a pound on another road, but cost other roads from ½ cent to 2½ cents less at the close of the year than at the beginning.

Little change took place in the prices of paint supplies. Two roads out of 11 paid ½ cent more per pound for linseed oil as the year advanced, but 5 other roads got mid-year increases back to the opening price, if not lower. Eight of 10 roads paid the same price throughout the year for white lead, 2 roads paid from ½ cent to a cent more, while the others paid about as much less.

Copper Prices Rise

Copper was one commodity whose price trend was definitely upward last year. The rise of the market price of this commodity is illustrated in one of the charts. However, while 7 out of 9 roads paid from ½ to 1 cent a pound more for sheet copper at the close of the year than at the beginning, 2 roads bought it for less, the prices to the indiivdual roads ranging from 19.7 to 28.7 cents a pound. Again, while 6 out of 10 roads paid higher prices for copper tubing, 2 roads bought it at the same price throughout the year and the others secured it at slight reduction, amounting on 1 road to 1 cent a pound. Nine of 10 roads paid advances for copper wire, which ranged from $0.153 to $0.187 a pound on different roads, but it cost one road slightly less in December. Advances took place in the price of weather-proof copper wire, which ranged from $.181 to $.22½ a pound, and in the case of journal bearings there was an advance of approximately $0.02 a pound in all cases. The cost of pig lead to 10 roads also increased during the past year although several bought it from 15 cents to 25 cents less a hundred in the last quarter.

There was little change in the price of lubricants, 6 out of 10 roads paying the same all year for car oil, 2 others from 1½ to 4½ cents less a pound. In the case of driving grease, 6 roads out of 10 bought at the same prices all year while an increase of half-a-cent a pound on one road was offset by a decrease of a cent-and-a-half on another.

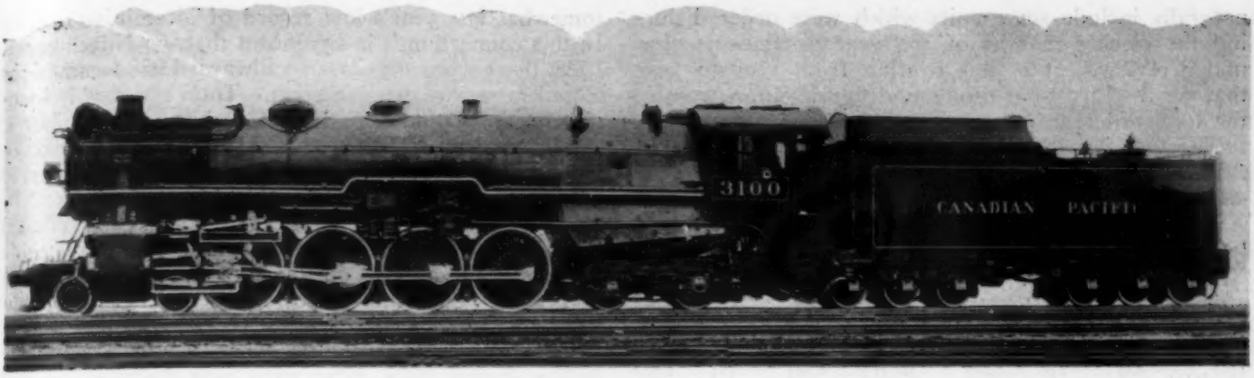
Prices for soda ash for water treatment did not vary throughout the year at an average of $1.59 a hundred for 10 roads. Six of 11 roads bought hydrated lime without change of price, 1 road paid $1 a ton more in December than in January and 4 roads got it for from $0.15 to $1.00 a ton less, the cost to individual roads ranging from $9.20 a ton to $20.35.

Oxygen, ranging from $0.75 to $1.55 a hundred cu. ft., remained virtually stationary on 10 roads, while the price of creosote oil, ranging from 8 to 45 cents a gallon, dropped as much as 3 cents a gallon on 2 roads. There was also a reduction in the cost to some roads for cement, the difference amounting to 30 cents a barrel in one case.

On the whole, it appears that railway material prices were slightly less, rather than higher than in the previous year, but it is evident that the change either way was small.

* * *

The C.N.R.'s "Ocean Limited" at Beloeil, Que.



Canadian Pacific 4-8-4 With Nickel-Steel Boiler, Built at Angus Shops

Locomotive Orders in 1928

Purchase of domestic locomotives during the year was lowest since 1921—Canadian orders increased

By Walter J. Taft
Associate Editor, *Railway Age*

LOCOMOTIVES ordered for domestic service in the United States during 1928 totaled only 603 and thus reached the lowest point to which these orders have fallen in seven years. In only two years since 1902 have fewer locomotives been ordered than in the past year. These are 1919 and 1921 when the figures were respectively 214 and 239.

Orders for locomotives placed by railroads in Canada with builders there, on the other hand, were substantially in excess of those reported a year ago, since 1928 saw orders for 98 units as against orders for 58 in 1927. Furthermore this 98 is a high point for Canadian orders of the past eight years.

Table I—Locomotive Orders in 1928

For service in the United States	603
For service in Canada	98
For export to other countries	27
Grand total	728

Export orders, however, followed the same general trend as did domestic orders since locomotives ordered for use in foreign territory totaled only 27. This is but one-half of the 1927 total of 54 and was the lowest point reached in export orders over a 14-year period.

Locomotives built in 1928, for service in the United States and Canada as distinguished from those ordered during the year, totaled 636 as compared with a 1927 total of 1,009. This distinction between locomotives ordered and the number built should be emphasized. A locomotive is under construction for several months and thus locomotive production figures for any year

Table II—Orders for Locomotives Since 1901

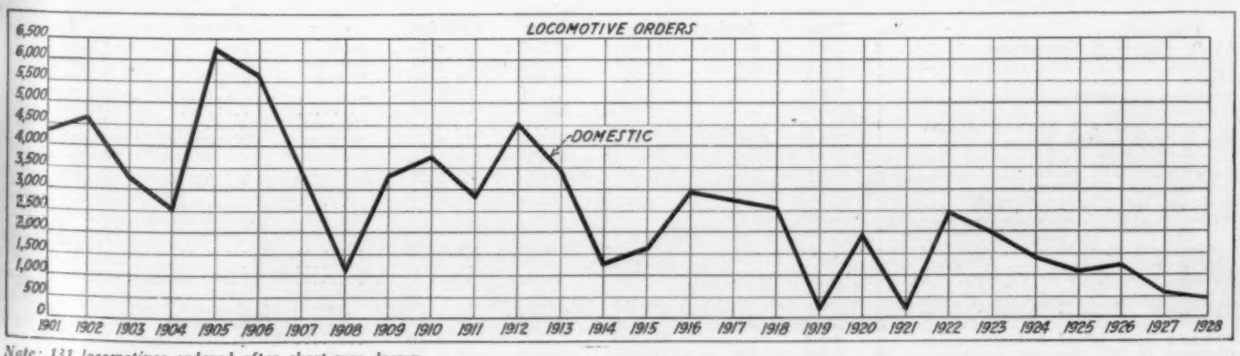
Domestic Orders Only

Year	Locomotives	Year	Locomotives
1901	4,340	1908	1,182
1902	4,665	1909	3,350
1903	3,283	1910	3,787
1904	2,538	1911	2,850
1905	6,265	1912	4,515
1906	5,642	1913	3,467
1907	3,482	1914	1,265

Domestic and Foreign

Year	Domestic	Canadian	Export	Total
1915	1,612	...	850	2,462
1916	2,910	...	2,983	5,893
1917	2,704	...	3,438	6,142
1918	2,593	209	2,086	4,888
1919	214	58	898	1,170
1920	1,998	189	718	2,905
1921	239	35	546	820
1922	2,600	68	131	2,799
1923	1,944	82	116	2,142
1924	1,413	71	142	1,626
1925	1,055	10	209	1,274
1926	1,301	61	180	1,542
1927	734	58	54	846
1928	603	68	27	728

Prior to 1918, Canadian orders included under "Domestic."



Note: 131 locomotives ordered after chart was drawn.

Locomotive Orders, 1901 to 1928

naturally include some units which were ordered during the closing months of the year previous to that under review. It is this overlap from year to year that results in a total production figure different from the total ordered.

The Car Service Division of the American Railway Association reports monthly totals of locomotive installations and retirements. This will not agree with the *Railway Age* totals of locomotives ordered or built. This follows because the Car Service Division total covers only Class I carriers, whereas the *Railway Age* figures cover all carriers, and also because the Car Service Division's report, includes, under installations, locomotives leased from other roads or rebuilt locomotives.

Table III—Locomotives Built in 1928

Domestic (United States, Canada)	636
Foreign	111
Total	747

Comparison with Previous Years

Year	Domestic	Foreign	Total	Year	Domestic	Foreign	Total
1896	866	309	1,176	1912†	4,403	512	4,915
1897	865	386	1,251	1913†	4,561	771	5,332
1898	1,321	554	1,875	1914†	1,962	273	2,235
1899	1,951	514	2,475	1915†	1,250	835	2,035
1900	2,648	505	3,153	1916†	2,708	1,367	4,075
1901	....	....	3,384	1917†	2,585	2,861	5,446
1902	....	....	4,070	1918†	3,668	2,807	6,475
1903	....	....	5,152	1919†	2,162	1,110	3,272
1904	....	....	3,441	1920†	2,022	1,650	3,672
1905*	4,896	595	5,491	1921†	1,185	638	1,823
1906*	6,232	720	6,952	1922†	1,303	231	1,534
1907*	6,564	798	7,362	1923†	3,505	280	3,795
1908*	1,886	456	2,342	1924†	1,810	226	2,036
1909*	2,596	291	2,887	1925†	994	291	1,285
1910*	4,441	314	4,755	1926†	1,585	185	1,770
1911*	3,143	387	3,530	1927†	1,009	167	1,176
				1928†	636	111	747

* Includes Canadian output.
† Includes Canadian output and equipment built in railroad shops.

The failure of the railways to enter the locomotive market with large orders during the past few years, and last year especially, can only be attributed to a disposition to postpone buying new power while power units on hand were sufficient to handle the business, even though purchases of locomotives of completely modern design might have brought some increased efficiency.

Prior to 1918 the rapid rate of traffic growth stimulated the purchase of locomotives to handle this increased business. Since that time, however, passenger business has declined by approximately one-third while the annual rate of growth in freight business is substantially less than in pre-war times. These factors, together with factors of increased locomotive effectiveness and equipment utilization, may serve to explain somewhat last year's low record of locomotive orders. In this connection it is significant that, on November 1, 1928, there were, on Class I railways, 4,958 locomotives stored in serviceable condition. Total serviceable locomotives on that date were 50,743, while on November 1, 1927, there were reported 52,111 serviceable locomotives with 5,520 of these stored. Thus over the period of a year the total of serviceable units was reduced by 1,368 while the number of these in storage was reduced only 562. It would seem, therefore, that serviceable locomotives in storage during the year constituted more than an adequate motive power reserve and hence new purchases were deferred.

Expectations that the railways would place large orders during 1928, after what was described in this report last year as "decidedly hesitant" buying during 1927, did not materialize.

With present motive power equipment adequate to the needs of traffic, the desire for modern locomotives which will bring operating economies must become the buying motive. Since this motive is not so compelling as would be one based on inadequacy of existing equipment, it is difficult to predict how much longer purchases will be deferred. It seems reasonable to assume, however, that after two years of drastically curtailed orders, the year 1929 should witness an upturn.

During the year the New York Central Lines ordered more locomotives than any other company, as it purchased 165 units for service on various parts of its system. This compares with the Erie order for 82 as the largest 1927 order and the Pennsylvania order of 375 as the 1926 leader.

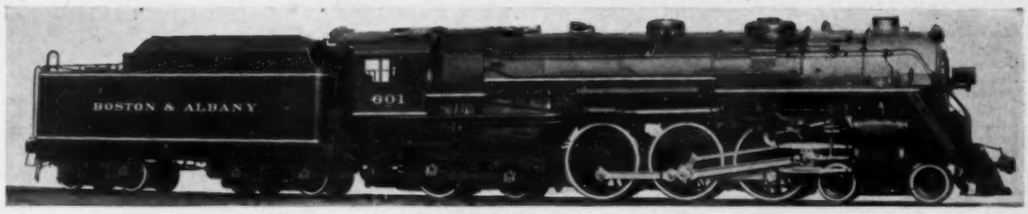
In the appended list of locomotive orders some few omissions of small orders doubtless occur. The details presented were supplied by railways and other purchasers of locomotives in response to inquiries from the *Railway Age*. They were checked against similar lists furnished through the co-operation of the builders, and amplified by reference to the weekly reports in the Equipment and Supplies column of the *Railway Age*. Because of the short time available for the compilation and the haste necessary to insure publication so soon after the end of the year, the *Railway Age* does not desire to make any claims as to the scientifically statistical accuracy of the tables or totals drawn from them. However, the real purpose of the statistics is to allow comparisons of the year's business with that of other years, which purpose it is hoped they meet with entire adequacy.

Locomotive Orders in 1928

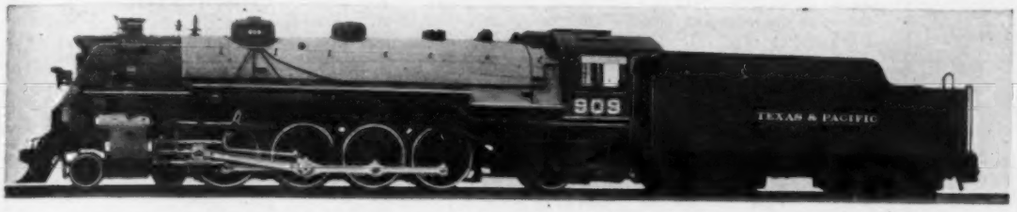
For Service in the United States

Purchaser	No.	Type	Service	Weight	Tractive force	Cylinders	Date of order	Date of delivery	Builder
Akron, Canton & Youngstown	2	2-8-2	Freight	315,000	65,800	26 x 30	April	June	Lima
Alabama State Docks	1	0-6-0	Sw.	163,000	39,100	21 x 28	February	May	American
Alaska	1	2-8-2	Frt.	243,000	56,600	22 x 28	October	1929	Baldwin
American Cyanamid Co.	1	0-6-0	....	136,000	.....	19 x 24	.....	.....	American
Anderson Tully	1	Geared	....	48,000	11,290	11 x 10	.....	.....	Heisler
Atchison, Topeka & Santa Fe	4	4-8-4	....	.....	.....	.....	December	.....	Baldwin
Bangor & Aroostook	1	0-8-0	Sw.	215,000	53,000	25 x 28	September	November	American
Barrett Company	1	0-4-0	Sw.	99,000	22,400	16 x 24	September	.....	Baldwin
Bazley, J. Robt.	1	Geared	....	84,000	22,000	14 x 12	.....	.....	Heisler
Belt Railway of Chicago	5	0-8-0	Sw.	257,700	63,600	27 x 30	September	December	Baldwin
Bessemer Limestone & Cement	1	Geared	....	110,000	24,375	15 x 12	.....	.....	Heisler
Boston & Albany	5	4-6-4	Pass.	353,000	44,800	25 x 28	March	July-Aug.	American
	5	4-6-6	Pass.	.....	41,600	23½ x 26	March	September	American
Central Iron & Coal	1	Geared	....	56,000	14,890	11 x 10	.....	.....	Heisler
Central Vermont	10	2-10-4	....	415,000	.....	27 x 32	.....	.....	American
Chicago, Burlington & Quincy	17		Sw.	.....	.....	.....	.....	1928	Company Shops
	6	2-10-4	Frt.	.....	.....	.....	December	1929	Baldwin
Chicago & Illinois Midland	1	4-4-0	Pass.	118,400	18,800	18 x 24	June	August	Baldwin
	2	2-8-2	Frt.	305,000	54,600	26 x 30	June	September	Lima
Chicago, Rock Island & Pacific	1	4-8-4	....	420,000	.....	27 x 32	.....	.....	American
Chicago, St. P., Minn. & Omaha	8	0-8-0	Sw.	238,930	58,400	25 x 28	April	.....	Baldwin
Chicago, West Pullman & So.	1	0-6-0	Sw.	191,580	46,800	23 x 28	June	.....	Baldwin
City of Seattle	1	2-6-2	Frt.	135,000	25,500	18 x 24	February	.....	Baldwin

Tr. force, eng., 44,800 lb.
Tr. force, booster, 10,600 lb.
Wt., engine, 353,000 lb.
Wt., drivers, 187,500 lb.
Cyls., 25 in. by 28 in.
Drivers, 75 in.
Pressure, 240 lb.
Evap. h. s., 4,484 sq. ft.
Superheater, 1,951 sq. ft.
Grate, 81.5 sq. ft.

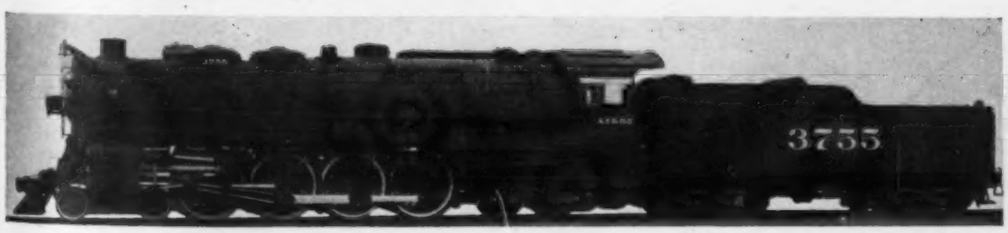


Boston & Albany 4-6-4 Type Locomotive with Limited Cut-off, Built by American Locomotive Company



Tr. force, 54,700 lb.
Wt., engine, 361,400 lb.
Wt., drivers, 245,600 lb.
Cyls., 27 in. by 30 in.
Drivers, 73 in.
Pressure, 215 lb.
Evap. h. s., 3,774 sq. ft.
Superheater, 1,032 sq. ft.
Grate, 80.3 sq. ft.

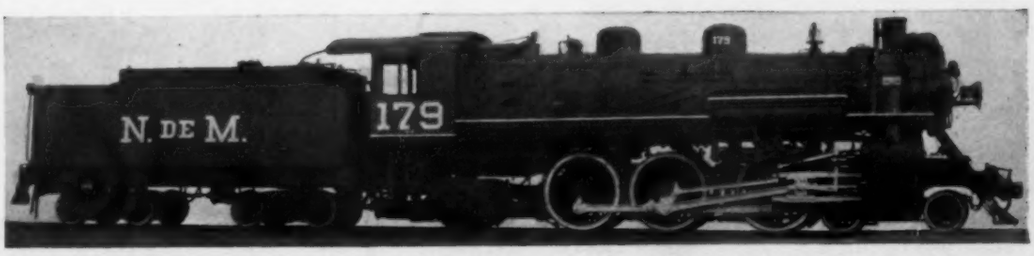
Texas & Pacific 4-8-2 Type Locomotive Built by The Baldwin Locomotive Works



Tr. force, 66,000 lb.
Wt., engine, 428,210 lb.
Wt., drivers, 272,100 lb.
Cyls., 30 in. by 30 in.
Drivers, 73 in.
Pressure, 210 lb.
Evap. h. s., 5,646 sq. ft.
Superheater, 2,426 sq. ft.
Grate, 108 sq. ft.

Atchison, Topeka & Santa Fe 4-8-4 Type Locomotive Built by The Baldwin Locomotive Works

Tr. force, engine, 42,600 lb.
Tr. force, booster, 10,460 lb.
Wt., engine, 262,000 lb.
Wt., drivers, 156,000 lb.
Cyls., (3) 20 in. by 28 in.
Drivers, 67 in.
Pressure, 200 lb.
Evap. h. s., 2,823 sq. ft.
Superheater, 758 sq. ft.
Grate, 52 sq. ft.



Three-Cylinder 4-6-2 Type Locomotive Built by American Locomotive Company for National Railways of Mexico

Purchaser	No.	Type	Service	Weight	Tractive force	Cylinders	Date of order	Date of delivery	Builder
Clearwater Timber Co.	1	Geared	....	219,000	38,480	18¼ x 16	.....	.....	Heisler
Clev., Cinn., Chi. & St. L.	25	4-8-2	Frt.	364,000	53,800	27 x 30	August	Jan.-Mar.	American
Delaware, Lackawanna & Western	20	4-8-4	Frt.	416,000	70,000	28 x 32	October	.....	American
Denkman Lumber	1	2-8-2	....	253,000	.....	23 x 28	.....	.....	American
Denver & Rio Grande Western	10	4-8-4	Pass.	408,500	61,000	27 x 30	November	Mar. '29	Baldwin
Electric Shovel Co.	6	Geared	....	84,000	22,000	14 x 12	.....	.....	Heisler
Erie	35	2-8-4	Frt.	461,470	71,000	28½ x 32	May	Sept.-Nov.	Baldwin
Essex Terminal	1	0-6-0	....	145,000	.....	20 x 26	.....	.....	American
Fischer Lumber Co.	1	Geared	....	110,000	24,375	15 x 12	.....	.....	Heisler
Great Northern	6	2-8-8-2	Freight	594,940	136,600	28 x 32-4 cyl.	January	December	Company Shops
	10	2-8-8-2	Freight	636,550	146,000	28 x 32-4 cyl.	July	May	Company Shops
	*14	Tenders	....	.....	.....	.....	February	December	Company Shops
	*10	Tenders	....	.....	.....	.....	November	May, '29	Company Shops
	6	4-8-4	....	.....	.....	.....	December	.....	Baldwin
Gulf, Mobile & Northern	2	4-6-2	Pass.	213,000	35,000	22 x 28	January	March	Baldwin
Hammermill Paper Co.	1	Geared	....	181,000	34,220	16¾ x 14	.....	.....	Heisler
Illinois Terminal	2	2-6-0	Sw.	182,000	36,700	22 x 26	September	December	Baldwin
	1	2-8-0	Sw.	182,000	36,700	22 x 26	February	.....	Baldwin
Indianapolis Union	1	0-8-0	Sw.	219,000	51,200	25 x 28	May	.....	Baldwin
International-Great Northern	5	2-8-4	Frt.	404,000	69,400	28 x 30	June	November	American
Kishacoquillas Valley	1	4-6-0	Pass. & Frt.	121,200	21,200	18 x 24	June	.....	Baldwin
Lehigh Coal & Nav.	1	Geared	....	110,000	24,375	15 x 12	.....	.....	Heisler
Long Island	10	4-6-0	Pass.	237,000	41,328	24 x 28	May	October	Company Shops
Louisville & Nashville	24	2-8-2	....	.....	.....	.....	December	.....	Baldwin
Michigan Central	5	4-6-4	Pass.	348,000	42,300	25 x 28	August	Jan. '29	American
Mich. Limestone & Chem. Co.	2	0-6-0	Sw.	157,880	35,300	21 x 26	March	.....	Baldwin
Minneapolis, St. P. & Sault Ste. Marie	8	4-8-2	....	350,000	.....	27 x 30	.....	.....	American
Missouri & North Arkansas	1	2-8-0	Frt.	190,000	38,000	21 x 28	September	September	American
	4	2-8-0	Frt.	228,500	45,700	23 x 32	October	October	American
Missouri Pacific	25	0-8-0	Sw.	.....	.....	.....	December	1929	Lima
Mud Bay Logging Co.	1	2-6-6-2	Frt.	210,000	42,500	18 & 28 x 24	January	.....	Baldwin
New York Central	15	4-6-4	Pass.	351,000	42,300	25 x 28	August	December	American
	10	4-6-4	Pass.	353,000	42,300	25 x 28	August	Jan. '29	American
	100	4-8-2	Frt.	.....	.....	.....	.....	December	American
Northern Pacific	1	4-8-4	Frt.	705,000	137,000	26 x 32-4 cyl.	January	December	American
Oregon-Washington R. R. & N. Co.	8	4-12-2	Frt.	496,500	96,650	27x31&32-3 cyl.	February	July-Aug.	American
Pacific Fruit Express	1	0-4-0	Sw.	103,000	22,400	16 x 24	November	.....	Baldwin
Pennsylvania	1	4-6-2	Pass.	310,600	58,092	.....	July	Feb. '29	Company Shops
	1	4-6-2	Pass.	310,600	58,092	27 x 30	July	Feb. '29	Baldwin
Port Utilities Comm., Charleston	1	0-6-0	Sw.	121,000	29,600	19 x 24	April	.....	Baldwin
Rapid City, Black Hills & West.	1	Geared	....	140,000	32,130	16¾ x 14	.....	.....	Heisler
Saginaw Logging Co.	1	2-6-6-2	Frt.	220,000	37,500	17 & 26 x 24	June	.....	Baldwin
Sinclair Refining Company	1	0-6-0	Sw.	129,500	25,500	18 x 24	February	March	Baldwin
Singer Mfg. Co.	1	Geared	....	176,000	35,460	16¾ x 14	.....	.....	Heisler
Sloss-Sheffield Steel & Iron Co.	1	2-8-0	Frt.	189,890	40,400	22 x 28	January	March	Baldwin
Solvay Process	2	0-4-0	....	65,000	.....	13 x 20	.....	.....	American
Southern Pacific	8	4-8-2	Pass.	368,000	57,510	28 x 30			
	10								
West Fork Logging	1	2-6-6-2	Frt.						
Weyerhauser Timber Co.	3	Geared	....	219,000					Shops
Wheeling & Lake Erie	5	0-8-0	Sw.	219,130	52,500				Company Shops
	5	0-6-0	Sw.	.....	.....	.....			
	5	0-8-0	Sw.	.....	.....	.....	November	.....	Company Shops
White River Lumber	1	Geared	....	219,000	38,480	18¼ x 16	.....	.....	Heisler

Canada

Purchaser	No.	Type	Service	Weight	Tractive force	Cylinders	Date of order	Date of delivery	Builder
Canadian National	10	0-8-0	Sw.	214,000	49,690	22 x 28	September	.....	Canadian
	15	2-10-2	Frt.	315,000	60,250	24 x 28	September	.....	Canadian
	5	4-8-2	Pass.	338,000	49,600	24 x 30	October	.....	Canadian
	20	4-8-4	....	389,000	.....	25½ x 30	.....	.....	Montreal
	10	0-8-0	....	214,000	.....	22 x 28	.....	.....	Montreal
Canadian Pacific	2	4-8-4	Pass.	424,000	60,000	25½ x 30	December '27	October	Company Shops
	25	2-8-2	Frt.	336,000	57,300	23 x 32	April	November	Montreal
Dominion Coal Co.	1	2-8-2	....	232,000	.....	21 x 28	.....	.....	Montreal
	1	2-6-0	....	150,000	.....	19 x 26	.....	.....	Montreal
Edmonton, Dunvegan & Br. Col.	4	2-10-0	Frt.	228,000	49,000	24 x 28	January	April	Canadian
Sydney & Louisburg	1	2-8-2	Frt.	232,000	41,300	21 x 28	January	September	Montreal
	1	2-6-0	Sw.	144,000	37,000	19 x 26	January	September	Montreal
Toronto, Hamilton & Buffalo	2	2-8-4	Frt.	383,000	69,000	28 x 30	January	July	Montreal
Vancouver Harbour Comm.	1	0-6-0	....	162,000	.....	21 x 28	.....	.....	Montreal

Export

Purchaser	No.	Type	Service	Weight	Tractive force	Cylinders	Date of order	Date of delivery	Builder
Columbia Navigation Co., Ltd.	1	2-8-0	....	97,000	.....	17 x 22	.....	.....	American
F. C. del Pacifico de Nicaragua	2	2-8-0	....	95,000	.....	17 x 22	.....	.....	American
Int. Rys. of Central America	2	2-8-2	Frt.	156,050	.....	18 x 22	May	July	Baldwin
	4	2-8-2	Pass.-Frt.	94,700	.....	16 x 20	June	September	Baldwin
Interoceanic	6	2-6-6-2	....	210,000	.....	15 x 22	.....	.....	American
Mogyana (Brazil)	2	4-6-0	....	79,000	.....	15 x 20	August	.....	American
Mexican Railway	2	4-6-2	....	250,000	.....	20 x 28-3 cyl.	.....	.....	American
National Rys. of Mexico	2	4-6-2	....	250,000	.....	20 x 28-3 cyl.	.....	.....	American

Oil-Electric or Gasoline Locomotives

Purchaser	No.	Wheel arrangement	Type	Weight	Tractive force	Cylinders No. Dia. and stroke	Builders
American Rolling Mill Co.	1	0-4-4-0	Oil-Electric	230,000	60,000	.....	Ingersoll Rand-Amer. Gen. Elec.
	3	0-4-4-0	Oil-Electric	148,000	36,000	.....	Ingersoll Rand-Amer. Gen. Elec.
Donner Steel Co.	2	0-4-4-0	Oil-Electric	136,000	37,000	10 x 12-6 cyl.	Ingersoll Rand-Amer. Gen. Elec.
	3	0-4-4-0	Oil-Electric	136,000	37,000	10 x 12-6 cyl.	Ingersoll Rand-Amer. Gen. Elec.

* Not included in totals.

Oil-Electric or Gasoline Locomotives—*Continued*

Purchaser	No.	Wheel arrangement	Type	Weight	Tractive force	Cylinders No. Dia. and stroke	Builders
ic	1	0-4-4-0	Oil-Electric	130,000	36,000	.....	Ingersoll Rand-Amer. Gen. Elec.
oboken Mfrs. R. R.	1	0-4-4-0	Oil-Electric	144,000	36,000	.....	Ingersoll Rand-Gen. Electric
	1	0-4-4-0	Oil-Electric	220,000	60,000	.....	Ingersoll Rand-Gen. Electric
inois Central	1	0-4-4-0	Oil-Electric	220,000	60,000	.....	Ingersoll Rand-Gen. Electric

Export

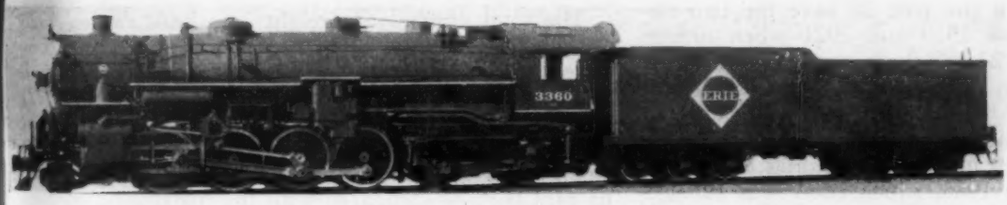
ited Fruit Co.	2	0-4-4-0	Oil-Electric	.....	.....	.....	General Electric

Electric Locomotives

Purchaser	No.	Wheel arrangement	Service	Weight	Tractive force	Voltage	Date of order	Date of delivery	Builder
merican Rolling Mill Co.	3	0-4-4-0	Sw.	140,000	.....	.....	December	.....	Westinghouse
ic., So. Shore & So. Bend	2	4-4	Frt.	164,000	40,000	.....	April	October	Westing.-Bald.
leveland Union Terminals Co.	25	2-6+6-2	....	.....	.....	.....	1928	.....	Amer. Genl. Elec.
reat Northern	1	2-8-2	Frt.&Pass.	715,000	88,500	.....	April	Feb. '29	Westing.-Bald.
noxville Power Co.	1	0-4-0	Sw.	43,000	.....	.....	.....	.....	Westinghouse
idland Utilities	2	0-4-4-0	Freight	162,500	16,000	.....	May	September	Westinghouse
iagara Junction	1	0-4-4-0	Freight	120,000	10,800	.....	October	Mar. '29	Westinghouse
orthern Ill. Coal Co.	1	0-4-4-0	Sw.	88,000	.....	.....	.....	.....	Westing.-Porter
	1	0-4-4-0	Sw.	88,000	.....	.....	.....	.....	Westing.-Porter
rter Co., H. K.	1	0-4-4-0	Sw.	60,000	.....	.....	.....	.....	Westing.-Porter
emington Arms Co.	1	0-4-0	Sw.	24,000	.....	.....	.....	.....	Westing.-Porter
acramento Northern	2	0-4-4-0	Freight	135,600	36,000	.....	February	July	General Electric
nd Spring R. R.	1	0-4-4-0	Freight	100,000	9,080	.....	March	July	Westinghouse
imken Roller Brg. Co.	1	0-4-0	Sw.	60,000	.....	.....	.....	.....	Westing.-Porter
oledo & Western	1	0-4-4-0	Freight	100,000	9,080	.....	September	November	Westinghouse
win Branch	2	0-4-4-0	Sw.	115,000	3,500	.....	September	December	Westinghouse
Waterloo, Cedar Falls & Nor.	1	0-4-4-0	Freight	100,000	9,080	.....	October	November	Westinghouse
Westinghouse Elec. & Mfg. Co.	1	0-4-4-0	Sw.	120,000	.....	.....	March	December	Company Shops
Whitcomb Co., Geo. D.	1	0-4-0	Sw.	50,000	.....	.....	.....	.....	Westing.-Whit.
	1	0-4-0	Sw.	90,000	.....	.....	.....	.....	Westing.-Whit.

Export

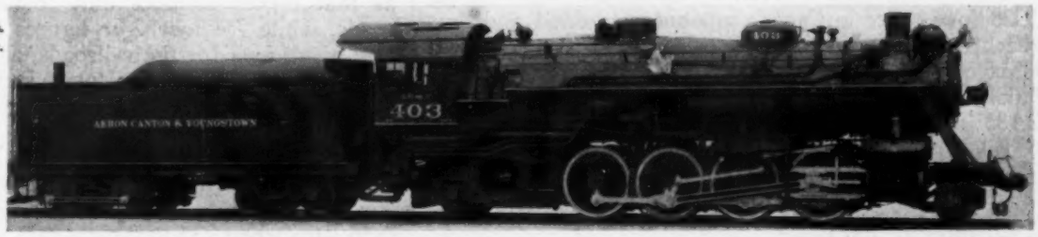
Purchaser	No.	Wheel arrangement	Service	Weight	Tractive force	Voltage	Date of order	Date of delivery	Builder
Mexican Railway	2	0-4+4+4-0	Frt.&Pass.	309.000	48,500	.....	July	June '29	General Electric
Paulista Railway of Brazil	1	2-6+6-2	....	.....	.....	.....	1928	1928	General Electric
	1	2-6+6-2	....	.....	.....	.....	1928	1928	General Electric



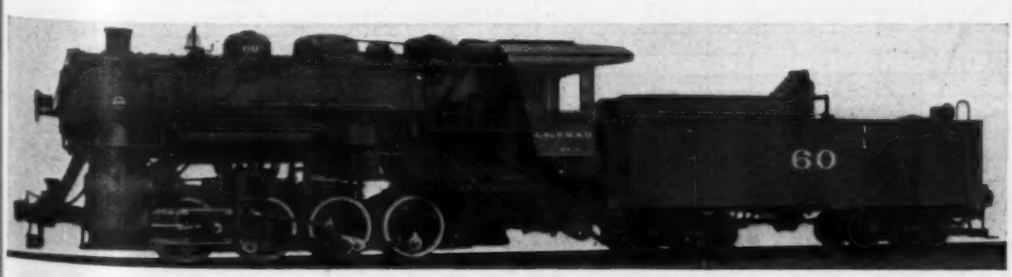
Erie 2-8-4 Type Locomotive Built by The Baldwin Locomotive Works

Tr. force, engine, 71,000 lb.
Tr. force, booster, 13,000 lb.
Wt., engine, 461,470 lb.
Wt., drivers, 284,670 lb.
Cyls., 28½ in. by 32 in.
Drivers, 70 in.
Pressure, 225 lb.
Evap. h. s., 5,691 sq. ft.
Superheater, 2,480 sq. ft.
Grate, 100.3 sq. ft.

Tr. force, engine, 54,600 lb.
Tr. force, aux. loco., 14,400 lb.
Wt., engine, 313,800 lb.
Wt., drivers, 223,300 lb.
Cyls, 26 in. by 30 in.
Drivers, 63 in.
Pressure, 200 lb.
Evap. h. s., 3,502 sq. ft.
Superheater, 940 sq. ft.
Grate, 66.7 sq. ft.



Akron, Canton & Youngstown 2-8-2 Type Loco motive Built by Lima Locomotive Works, Inc.



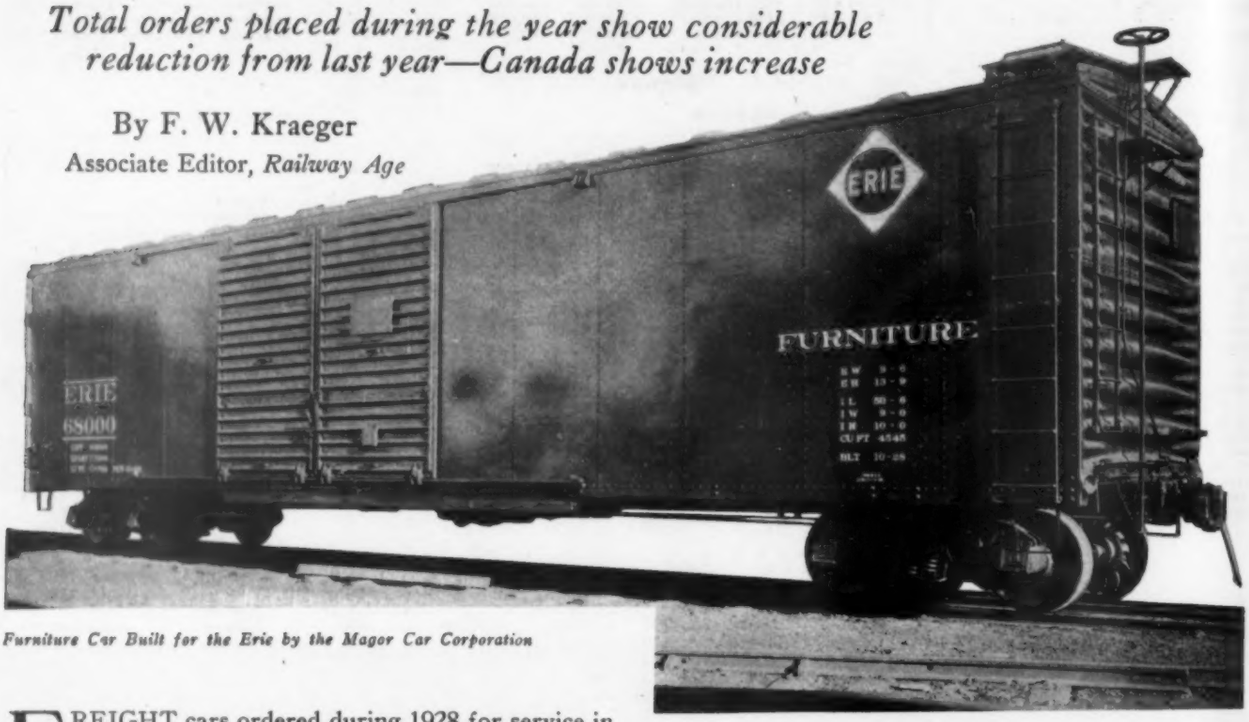
Chicago, St. Paul, Minneapolis & Omaha 0-8-0 Type Locomotive Built by The Baldwin Locomotive Works

Tr. force, 58,400 lb.
Wt., engine, 238,930 lb.
Wt., drivers, 238,930 lb.
Cyls., 25 in. by 28 in.
Drivers, 51 in.
Pressure, 200 lb.
Evap. h. s., 2,384 sq. ft.
Superheater, 739 sq. ft.
Grate, 47 sq. ft.

Freight Car Orders in 1928

Total orders placed during the year show considerable reduction from last year—Canada shows increase

By F. W. Kraeger
Associate Editor, *Railway Age*



Furniture Car Built for the Erie by the Magor Car Corporation

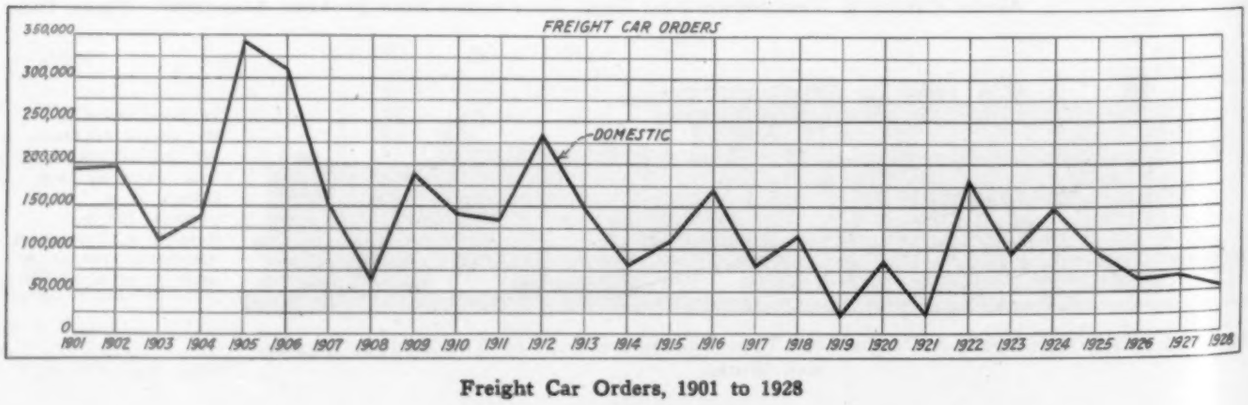
FREIGHT cars ordered during 1928 for service in the United States totaled only 51,200, or less than any year in the past 28 save the two abnormally poor years of 1919 and 1921 when orders were for 22,062 and 23,346 units respectively. This 1928 total is more than 20,000 less than the 1927 total of 72,006 and about 15,000 less than the 67,029 ordered during 1926, a year which was described in this article two years ago as "even more disappointing to the car building industry than 1925, which itself was subnormal." The 1925 domestic freight car orders totaled 92,816.

The freight cars ordered by Canadian roads during 1928 for service in Canada amounted to 8,901 and thus reached a high point for the past eight-year period. It is exceeded only by the 12,406 ordered in 1920 and the 9,657 ordered in 1918 and compares with orders for 2,133 in 1927 and 1,495 in 1926.

Likewise export orders for freight cars in 1928 reached their highest point in four years. The 1928 total of 2,530 compares with a 1927 figure of 646 and a 1926 total of 1,971.

The total number of freight cars built during 1928 for service in the United States was 46,060 as compared with 63,390 in 1927. This 1928 production is below that of any other year since 1900, except 1921 when only 40,292 freight cars were produced. These production figures should not be confused with the totals of orders placed. Nor should the total number of cars built be compared with the installation of cars, reported in the statistics issued monthly by the Car Service division of the American Railway Association, as that report includes only installations on Class I roads, while *Railway Age* figures include the production of all cars for the railroads, as well as private car lines. The *Railway Age* totals include only new cars, or those having new bodies, whereas the Car Service division figures include leased and, in prior years, have included rebuilt cars.

As was stated at the outset, the year 1926 with orders for 67,029 was described as "even more disappointing" than 1925 when 92,816 freight cars were ordered. There



Freight Car Orders, 1901 to 1928

is little to add in describing 1928's business, which amounted to little more than 50 per cent of that which was regarded as sub-normal in 1925.

Purchases of freight cars, as is true of locomotive buying, have no doubt been influenced to a great extent by the increased efficiency of railway operation.

Table I—Freight Car Orders in 1928

For service in the United States	51,200
For service in Canada	8,901
For export to other countries	2,530
Grand total	62,631

Table II—Orders for Freight Cars Since 1901

Year	Domestic Orders Freight cars	Year	Freight cars
1901	193,439	1908	62,669
1902	195,248	1909	189,360
1903	108,936	1910	141,024
1904	136,561	1911	133,117
1905	341,315	1912	234,758
1906	310,315	1913	146,732
1907	151,711	1914	80,264

Year	Domestic and Foreign Domestic	Canadian	Export	Total
1915	109,792	.....	18,222	128,014
1916	170,054	.....	35,314	205,368
1917	79,367	.....	53,191	132,558
1918	114,113	9,657	53,547	177,317
1919	22,062	3,837	3,994	29,893
1920	84,207	12,406	9,056	105,669
1921	23,346	30	4,982	28,358
1922	180,154	746	1,072	181,972
1923	94,471	8,685	396	103,552
1924	143,728	1,867	4,017	149,612
1925	92,816	642	2,138	95,596
1926	67,029	1,495	1,971	70,495
1927	72,006	2,133	646	74,785
1928	51,200	8,901	2,530	62,631

Prior to 1918, Canadian orders included in domestic.

Improved utilization in the past few years has made it unnecessary for railways to go out and buy freight cars, in the same degree as formerly, to care for increases in traffic. Furthermore traffic increases have in recent years come at a smaller annual rate than formerly. But these factors of efficiency, increased utilization and lessened rate of traffic growth do not adequately explain the abnormally poor 1928 market. An adequate explanation is difficult. It may be suggested, however, that during the past 15 years an increasing proportion of freight cars in use have been of steel or steel underframe construction. This proportion rose from 52.1 in 1915 to 80.3 at the end of 1927. These steel cars lend themselves more readily to rebuilding than do the obsolete wooden cars and thus during the years following 1922 the Car Service division totals of cars installed, which include rebuilt cars, ran substantially ahead of the orders until 1927 when cars installed were 72,410 and those ordered totaled 72,006. As these figures approach each other it seems reasonable to assume that the railways have completed rebuilding on a large scale and thus new orders may be expected increasingly to become the source of replacements.

The appended tables contain a detailed statement of orders placed for new freight cars with builders during 1928 by railroads and industrial concerns; also those placed in Canada and for export. The list of orders was compiled from information furnished to the *Railway Age* by the railroads, private car lines, and other purchasers of cars, in response to requests for this information. The data thus furnished were then checked against lists of orders supplied by the car builders, and amplified accordingly, and also against the weekly reports of orders appearing in the Equipment and Supplies column of the *Railway Age*. The production figures were secured in response to requests of the car builders for this information. As in former years the *Railway Age* is especially indebted to the American Railway Car Institute in securing the reports of the companies affiliated with that organization.

The following closing paragraph is quoted from last year's annual review number. "The *Railway Age* is not sufficiently optimistic to believe that the lists can include all the orders placed or that the figures of production are of scientific accuracy. It feels that such accuracy would be next to impossible, in view of the short space of time permitted for the compilations due to the desirability of having the results available at the close of the year with which they deal. However, it is believed that such omissions as occur will be found to be small and unimportant, and will not vitiate the value of the figures, particularly as concerns comparison with preceding years, which, after all, is the primary purpose of the compilations."

Table III—Freight Cars Built in 1928

	United States	Canada	Total
Domestic	46,060	5,158	51,218
Foreign	938	....	938
Total	46,998	5,158	52,156

Comparison with Previous Years

Year	Domestic	Foreign	Total
1899	117,982	1,904	119,886
1900	113,070	2,561	115,631
1901	132,591	4,359	136,950
1902	161,747	2,800	162,599
1903	153,195	1,613	152,801
1904	60,955	1,995	60,806
1905*	162,701	5,305	165,155
1906*	236,451	7,219	240,503
1907*	280,216	9,429	284,188
1908*	75,344	1,211	76,555
1909*	91,077	2,493	93,570
1910*	176,374	4,571	180,945
1911*	68,961	3,200	72,161
1912†	148,357	4,072	152,429

* Includes Canadian output.
† Includes Canadian output and equipment built in company shops.

	United States			Canadian			Grand
	Domestic	Foreign	Total	Domestic	Foreign	Total	total
1913	176,049	9,618	185,667	22,017	....	22,017	207,684
1914	97,626	462	98,088	6,453	....	6,453	104,451
1915	58,226	11,916	70,142	1,758	2,212	3,970	74,112
1916	111,516	17,905	129,421	....	....	5,580	135,001
1917	115,705	23,938	139,643	3,658	8,100	11,758	151,401
1918	67,963	40,981	108,044	14,704	1,960	16,664	124,708
1919	94,981	61,783	156,764	6,391	30	6,421	163,185
1920	60,955	14,480	75,435	....	....	....	....
1921	40,292	6,412	46,704	8,404	745	9,149	55,853
1922	66,289	1,126	67,415	458	100	558	67,973
1923	175,748	2,418	178,166	....	....	....	....
1924	113,761	1,141	114,902	1,721	....	1,721	116,623
1925	105,935	3,010	108,945	....	....	....	....
1926	88,862	2,771	91,633	1,645	....	1,645	93,278
1927	63,390	1,087	64,477	2,851	....	2,851	67,328
1928	46,060	938	46,998	5,158	....	5,158	52,156

Table IV is tabulation of orders.

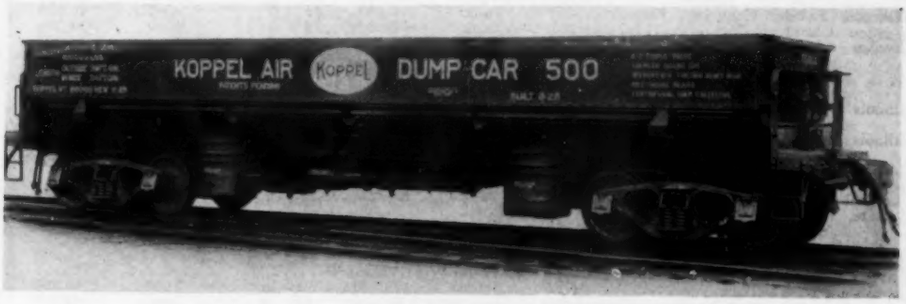
Freight Car Orders in 1928

For Service in the United States

Purchaser	No.	Class	Capacity	Length Ft.	Length In.	Construction	Weight	Date of Order	Date of Delivery	Builder
Alaska	8	Air Dump	25 cu. yd.	34	0	Steel	69,800	January	June	W. Wh. Scraper
	2	Heater	70,000	40	0	Wood	42,000	January	March	Company Shops
	10	Coal	1290 cu. ft.	37	3	Wood	35,500	February	July	Company Shops
Akron, Canton & Youngstown	4	Side Dump	30 cu. yd.	.....		.....	.....	December	.....	Magor
Aluminum Co. of America	1	Tank	8,000g.	.....		.....	.....	March	.....	Standard Tank
Amer. Agricultural Chem. Co.	2	Tank	7,000g.	28	0	Steel	41,500	June	June	Am. Car & Fdy.
American Cyanamid Co.	25	Hopper	.....	.....		.....	.....	July	.....	Gen. Amer. Car

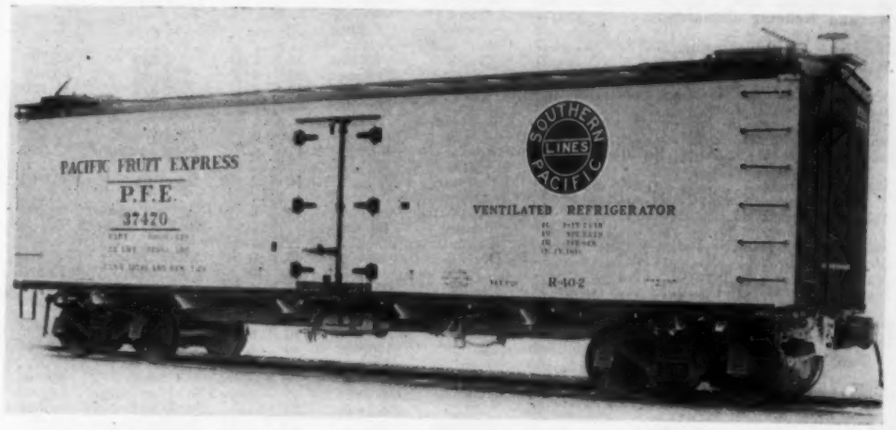
Purchaser	No.	Class	Capacity	Length Ft.	Length In.	Construction	Weight	Date of Order	Date of Delivery	Builder
American Oil Co.	1	Tank	4,500	.....		.....	.....	July	.....	Gen. Amer. Tank
	2	Tank	4,700	.....		.....	.....	September	.....	Gen. Amer. Tank
	2	Tank	6,000	.....		.....	.....	June	.....	Gen. Amer. Tank
	1	Tank	5,000	.....		.....	.....	June	.....	Gen. Amer. Tank
American Refrigerator Transit	1,000	Refrigerator	80,000	39	9⅛	St. Und'frame	59,000	November	Feb. '29	Pressed Steel
American Rolling Mill	6	Gondola	50 ton	36	4	Steel	23,060	February	April	Koppel
Armstrong Cork Co.	1	Tank	10,000g.	28	0	Steel	51,800	March	April	Am. Car & Fdy.
	3	Tank	10,000g.	28	0	Steel	51,800	November	December	Am. Car & Fdy.
Atchison, Topeka & Santa Fe	100	Air Dump	100,000	34	6	Steel	66,600	February	April	Magor
	100	Caboose	.....	28	4	Steel	47,100	February	April	Am. Car & Fdy
Atlantic City	1	.....	.....	.....		Steel	65,700	January	August	Company Shops
Atlantic Coast	200	Phosphate	140,000	35	11⅛	Steel	53,400	April	August	T. C. I. & R. R
Atmospheric Nit. Corp.	4	Hopper	80,000	30	0	Steel	45,000	November	March '29	Am. Car & Fdy
Baker Castor Oil Co.	1	Tank	6,000g.	27	0	Steel	37,400	October	November	Am. Car & Fdy.
	1	Tank	8,000g.	28	0	Steel	46,300	October	November	Am. Car & Fdy.
Baltimore & Ohio	2,000	Box	100,000	40	6	Steel	47,500	January	September	Standard Steel
	1,000	Box	100,000	40	6	Steel	47,500	1928	.....	Standard Steel
Bangor & Aroostook	100	S. S. Box	80,000	40	4½	Steel Frame	43,000	January	June	Company Shops
The Barrett Company	100	Tank	100,000	.....		Steel	.....	May	July-Aug.	Am. Car & Fdy.
	2	Tank	100,000	.....		Steel	.....	March	June	Gen. Amer. Tank
	16	Tank	100,000	.....		Steel	.....	June	September	Gen. Amer. Tank
	15	Tank	100,000	.....		Steel	.....	August	Oct.-Nov.	Gen. Amer. Tank
	6	Tank	100,000	.....		Steel	.....	October	November	Gen. Amer. Tank
	15	Tank	100,000	.....		Steel	.....	August	Oct.-Nov.	Am. Car & Fdy.
Booth & Flinn	34	Gondola	100,000	41	6	Steel	48,150	March	June	Bethlehem
Borden Company	15	Tank	100,000	40	5⅜	Steel Frame	.....	1928	1928	Pfaudler
Boston & Maine	500	Hopper	70 tons	.....		.....	.....	December	.....	Standard Steel
Brown Co.	2	Tank	30,000	28	10½	Steel	45,600	February	February	Am. Car & Fdy.
	1	Tank	60,000	30	0	Steel	59,700	September	December	Am. Car & Fdy.
	1	Tank	5,000g.	.....		.....	.....	June	.....	Gen. Amer. Tank
Butler Bros.	8	Dump	20 cu. yd.	25	8	Steel	53,800	February	March	Koppel
Canfield Oil Co.	2	Tank	4,500g.	28	0	Steel	38,800	April	May	Am. Car & Fdy.
Carnegie Steel	35	Tank	10,000g.	.....		Steel	49,140	May	June	Gen. Amer. Tank
	15	Tank	10,000g.	.....		Steel	49,600	May	June	Pet. Iron Wks.
Central of Georgia	50	Flat	100,000	42	0	St. Und'frame	36,400	January	June	T. C. I. & R. R
	500	Gondola	100,000	42	0	Steel	42,500	January	June	T. C. I. & R. R
Central Vermont	500	S. S. Auto	40-ton	40	6	Steel	51,000	November	1929	Pressed Steel
Charleston & Western Car.	45	.....	.....	.....		.....	.....	.....	1928	Company Shops
Chesapeake & Ohio	300	Hopper	140,000	41	2⅞	Steel	51,500	January	June-July	Richmond Car
	200	Hopper	140,000	41	2⅞	Steel	51,500	January	June-July	Am. Car & Fdy.
	300	Hopper	140,000	41	2⅞	Steel	51,500	August	December	Richmond Car
	200	Hopper	140,000	41	2⅞	Steel	51,500	August	December	Am. Car & Fdy.
Chicago & Eastern Illinois	300	Auto	80,000	40	6	St. Und'frame	48,600	July	.....	Mt. Vernon Car
	100	S. S. Box	80,000	40	6	Steel Frame	.....	July	December	Mt. Vernon Car
	200	Automobile	.....	.....		.....	.....	December	.....	Mt. Vernon Car
Chicago & North Western	500	Box	80,000	40	6	Steel Frame	50,000	March	August	Standard Steel
	300	Gondola	100,000	41	0	Steel	49,500	April	October	Standard Steel
	400	Gondola	140,000	48	6	Steel Frame	51,000	November	March	Standard Steel
	300	Flat	50-ton	46	8	St. Und'frame	40,100	November	1929	Pressed Steel
	500	Flat	100,000	46	0	St. Und frame	39,300	December '27	April	Am. Car & Fdy.
	500	Auto	80,000	40	6	Steel Frame	49,300	March	July & Aug.	Gen. Amer. Car
	200	Ballast	100,000	33	1⅞	Steel	46,700	December	Mar. '29	Rodger Ballast
Chicago, Burlington & Quincy	150	Hart Conv.	100,000	33	1⅞	Steel	46,400	February	June	Rodger Ballast
	500	S. S. Box	100,000	40	6	Steel Frame	45,800	January	June-Aug.	Company Shops
	250	Flat	100,000	45	0	St. Und'frame	39,000	March	1929	Company Shops
	500	Hopper	100,000	34	3	Steel	44,800	February	1929	Company Shops
	250	Stock	80,000	36	1¾	Steel Frame	35,300	February	May	Company Shops
Chicago Great Western	200	Box	100,000	40	6	Steel Frame	48,000	December	.....	Pullman
	200	Auto	80,000	40	6	Steel Frame	46,500	December	.....	Pullman
	100	Auto	100,000	50	6	Steel Frame	54,000	December	.....	Pullman
Chicago, Indianapolis & Louisville	50	Stock	80,000	36	9¼	Steel Frame	38,400	November	Feb. '29	Company Shops
Chic., Milwaukee, St. P. & Pac.	1,250	S. S. Box	100,000	40	6	St. Und'frame	46,500	April	October	Bettendorf
	500	S. S. Box	100,000	40	6	St. Und'frame	46,500	April	September	Pressed Steel
	250	S. S. Box	100,000	40	6	St. Und'frame	46,500	April	October	Pac. Car & Fdy.
	500	S. S. Box	100,000	40	6	St. Und'frame	46,500	April	September	Gen. Amer. Car
	300	Automobile	100,000	40	6	St. Und'frame	52,400	April	September	Am. Car & Fdy.
	500	S. D. Stock	80,000	36	0	St. Und'frame	40,800	April	August	Ryan
	150	D. D. Stock	80,000	36	0	St. Und'frame	44,200	April	August	Standard Steel
	200	Oth	100,000	24	2¼	Steel	43,400	April	August	Pressed Steel
	500	Hopper	140,000	41	3	Steel	52,800	April	October	Standard Steel
	500	Hopper	140,000	41	3	Steel	53,500	April	September	Pullman
	2	Special Flat	400,000	44	0	Steel	103,000	May	October	Standard Steel
	100	Box	.....	.....		.....	.....	October	.....	Company Shops
Chicago, Rock Island & Pacific	250	Gondola	100,000	41	0	Steel	48,400	July	November	Ryan
	10	Air Dump	.....	.....		.....	.....	August	.....	W. Wh. Scraper
	500	.....	.....	.....		.....	.....	.....	1928	Company Shops
Chicago, St. P., Minn. & Omaha	300	Gen. Service	100,000	42	10	Steel	48,000	April	October	Siems-Stembel
	200	Flat	.....	.....		.....	.....	June	.....	Pullman
	250	Stock	.....	.....		.....	.....	June	.....	Pullman
Chic., So. Shore & So. Bend	2	Caboose	.....	30	0	Steel Frame	60,000	April	October	Am. Car & Fdy.
	2	Caboose	.....	.....		.....	.....	December	.....	Am. Car & Fdy.
Chicago Tank Car Co.	40	Tank	8,000g.	28	0	Steel	41,800	October	November	Am. Car & Fdy.
Cincinnati, Hamilton & Dayton	6	Ballast	80,000	34	11	St. Und'frame	37,300	July	October	Am. Car & Fdy.
Cities Service Co.	4	Tank	.....	.....		.....	.....	July	.....	Gen. Amer. Tank
	10	Tank	12,000g.	33	0	Steel	47,700	August	October	Am. Car & Fdy.
Clev., Cinn., Chi. & St. L.	1,000	Auto-Box	110,000	40	6	Steel	53,000	April	Aug.-Feb.	Merch. Despatch
Conley Tank Car Co.	5	Tank	6,000g.	27	0	Steel	44,100	February	April	Am. Car & Fdy.
	50	Tank	40 tons	28	0	Steel	41,300	February	August	Am. Car & Fdy.
Continental Tank Car Co.	50	Tank	80,000	.....		All Steel	39,900	May	July-Aug.	Pet. Iron Wks.
Cook Paint & Varnish Co.	1	Tank	6,000g.	27	0	Steel	42,900	January	February	Am. Car & Fdy.
	1	Tank	6,000g.	27	0	Steel	41,300	January	February	Am. Car & Fdy.
Cudahy Ref. Line & Cud. Oil Tank	100	Refrigerator	80,000	36	8	St. Und'frame	54,000	March	October	Company Shops
Delaware & Hudson	3	Gondola	.....	.....		.....	.....	.....	1928	Company Shops
Delaware, Lackawanna & Western	100	D. S. Auto	110,000	40	6	St. Und'frame	48,000	October	Jan. '29	Am. Car & Fdy.
	20	Caboose	.....	.....		.....	.....	.....	1928	Company Shops
Derby Oil Co.	10	Tank	10,000g.	.....		Steel	.....	April	June	Penn. Iron Wks.
Diamond Alkali Co.	2	Tank	30,000	28	10½	Steel	45,600	November	December	Am. Car & Fdy.
	4	Tank	60,000	42	3	Steel	30,100	November	December	Am. Car & Fdy.
	5	Tank	15 tons	27	2½	Steel	46,200	November	.....	Standard Tank
Dow Chemical Co.	4	Tank	8,000g.	28	0	Steel	44,800	January	March	Am. Car & Fdy.
	4	Tank	8,000g.	28	0	Steel	45,100	August	September	Am. Car & Fdy.
Du Pont, E. I. de Nemours, Corp.	2	Tank	7,000g.	28	0	Steel	42,800	March	May	Am. Car & Fdy.
	7	Tank	7,000g.	28	0	Steel	42,800	June	December	Am. Car & Fdy.
	1	Tank	7,000g.	28	0	Steel	42,800	September	November	Am. Car & Fdy.
	20	Tank	50,000	39	3⅛	Steel	80,900	October	April	Am. Car & Fdy.
East. Tenn. & Western N. C.	2	.....	.....	.....		.....	.....	.....	1928	Company Shops
Electric Shovel Coal Corp.	30	Hopper	80,000	28	5¾	Steel	37,400	July	December	Am. Car & Fdy.
Electro Bleach. Gas Co.	3	Tank	60,000	30	0	Steel	59,700	January	February	Am. Car & Fdy.
Elk Refining Co.	20	Tank	8,000g.	36	8½	Steel	43,600	November	.....	Standard Tank
Emp. Size & Chemical	1	Tank	8,000g.	28	0	Steel	41,500	January	February	Am. Car & Fdy.
Erie	100	Furniture	80,000	50	6	Steel	58,800	June	Nov.-Dec.	Magor
	500	Box	80,000	40	6	Steel	44,700	June	Oct.-Dec.	Pressed Steel
	400	Auto	80,000	40	6	Steel	51,000	June	Nov.-Dec.	Standard Steel
	1	Air Dump	30 cu. yd.	.....		.....	.....	July	.....	Clark Car
	1	Air Dump	27 cu. yd.	.....		.....	.....	July	.....	Differential Steel

Flat Car Built by the American Car & Foundry Company
Capacity, 50 tons; light weight, 38,800 lb.; load limit, 130,200 lb.; built, February, 1928



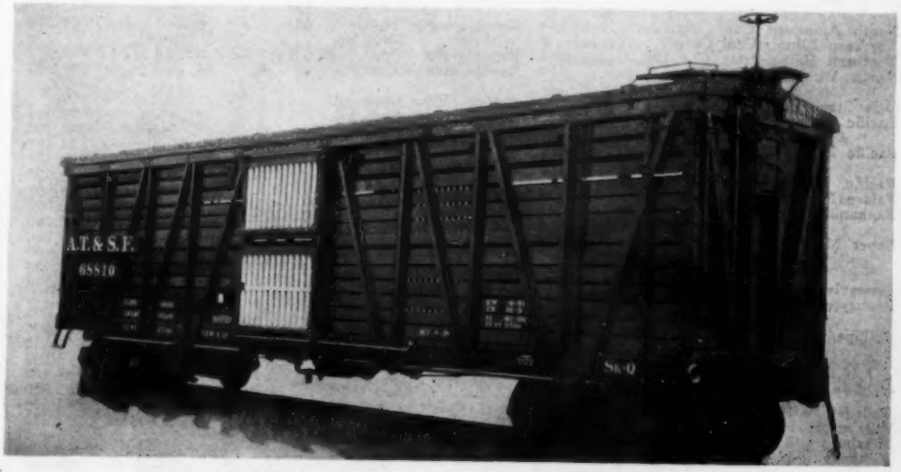
Capacity, 50 tons
Cubic capacity, 30 cu. yd.
Inside length, 34 ft.
Outside length, 38 ft. 4 in.
Built, June, 1928

Dump Car Built by the Koppel Industrial Car & Equipment Corporation



Capacity, 40 tons
Light weight, 53,700 lb.
Load limit, 82,300 lb.
Inside length, 33 ft. 2¾ in.
Inside width, 8 ft. 2¾ in.
Inside height, 7 ft.
Built, July, 1928

Refrigerator Car Built by the Pullman Car & Manufacturing Company



Capacity, 40 tons
Light weight, 47,700 lb.
Load limit, 88,300 lb.
Inside length, 40 ft.
Width at eaves, 9 ft. 7½ in.
Built, August, 1928

Stock Car Built by the Pennsylvania Car Company

Purchaser	No.	Class	Capacity	Length Ft.	Length In.	Construction	Weight	Date of Order	Date of Delivery	Builder
Fruit Growers' Express	170	Refrigerator	50,000	32	6	St. Cent. Sills	52,000	Sept. '27	1928	Company Shops
	450	Refrigerator	75,000	33	2¾	St. Und'frame	55,000	February	1928	Company Shops
	14	Refrigerator	75,000	33	2¾	St. Und'frame	55,000	Dec. '27	1928	Company Shops
	25	Refrigerator	75,000	33	2¾	St. Und'frame	55,000	October	1928	Company Shops
	23	Refrigerator	90,000	33	2¾	St. Und'frame	56,000	Apr.	1928	Company Shops
	300	Refrigerator	90,000	33	2¾	St. Und'frame	56,000	Sept. '27	1928	Company Shops
	150	Refrigerator	90,000	33	2¾	St. Und'frame	56,000	June	1928	Company Shops
Grand Trunk Western	500	S. S. Auto	40-ton	40	6	Steel	51,000	November	1929	Pressed Steel
Great Northern	8	Air Dump	30 cu. yd.	31	9	Steel	78,500	January	June	Koppel
	500	Flat	100,000	52	8	Steel Frame	41,000	September	February	Siems-Stembel
	500	Flat	100,000	52	0	Steel Frame	43,500	September	January	Standard Steel
	300	Ore	150,000	19	11	Steel	43,500	November	April	Standard Steel
	500	Box	80,000	40	0⅝	St. Und'frame	43,100	January	May	Company Shops
	500	S. S. Auto	100,000	50	6	Steel Frame	56,000	September	Mar. '29	Company Shops
	27	Caboose	.....	24	5	St. Und'frame	35,900	August	September	Company Shops
	200	Gen. Service	50 tons	.....		.....	.....	December	.....	Pressed Steel
Gr. Western Electrochem. Co.	3	Tank	60,000	42	3	Steel	30,100	January	February	Am. Car & Fdy.
Gulf Coast Lines	15	S. S. Auto	80,000	40	6	St. Und'frame	.....	.....	November	St. Louis Car
Gulf St. Creosoting Co.	5	Tank	8,000g.	28	0	Steel	44,300	March	April	Am. Car & Fdy.
Hainesport Mining & Transp.	4	Hopper	50 tons	21	10	Steel	36,750	May	June	Am. Car & Fdy.
Hercules Cement	10	Hopper	140,000	29	6	Steel	47,000	September	December	Standard Steel
	10	Hopper	140,000	29	6	Steel	47,000	October	December	Standard Steel
Hercules Powder Company, Inc.	10	Tank	100,000	36	0	Steel	40,000	November	December	Am. Car & Fdy.
Heyden Chemical Corp.	1	Tank	6,000g.	28	0	Steel	38,200	October	December	Am. Car & Fdy.
Hooker Electrochemical Co.	5	Tank	.....	34	4½	Steel	61,700	February	May	Standard Tank
	5	Tank	.....	34	4½	Steel	61,900	May	July	Standard Tank
	3	Tank	10,000g.	36	8½	Steel	47,400	June	July	Standard Tank
	5	Tank	60,000	30	0	Steel	59,700	February	May	Am. Car & Fdy.
Illinois Central	2	Air Dump	.....	.....		.....	.....	July	.....	W. Wh. Scraper
	2	Air Dump	.....	.....		.....	.....	February	.....	Differential Steel
Illinois Terminal	100	S. S. Box	80,000	36	0	Steel Frame	45,000	September	December	Mt. Vernon
	100	Gondola	100,000	40	6½	Steel	49,800	September	December	Am. Car & Fdy.
International-Great Northern	15	S. S. Auto	80,000	40	6	St. Und'frame	48,000	.....	November	St. Louis Car
Kansas City Southern	1	Work	.....	.....		.....	.....	.....	1928	Company Shops
Kendall Refining Co.	3	Tank	100,000	36	0	Steel	.....	August	September	Warren Tank Car
Lazote, Inc.	2	Tank	30,000	35	1	Steel	65,600	May	September	Am. Car & Fdy.
	36	Tank	50,000	39	3⅛	Steel	80,900	May	November	Am. Car & Fdy.
	25	Tank	.....	.....		.....	.....	October	.....	Gen. Amer. Tank
Lehigh & New England	3	Caboose	60,000	23	3⅛	Steel Frame	42,200	July	September	Pressed Steel
Live Poultry Transit Co.	11	Ref. Poultry	.....	.....		.....	.....	.....	1928	Company Shops
Louisville & Nashville	100	Ballast	100,000	30	6	Steel	46,300	January	May	Rodger Ballast
	1,200	Gondola	100,000	40	6	Steel	43,000	December	.....	Pressed Steel
	250	Gondola	140,000	45	0	Steel	52,000	December	.....	Mt. Vernon Car
	750	Auto	100,000	40	6	St. Und'frame	49,000	December	.....	Mt. Vernon Car
	300	Box	100,000	40	6	St. Und'frame	44,500	December	.....	Pullman
Maine Central	4	Box	50 tons	40	6	Steel	.....	September	November	Standard Steel
	6	Caboose	.....	.....		St. Und'frame	.....	.....	1928	Company Shops
Manganeferous Iron Co.	12	Air Dump	20 cu. yd.	.....		Steel	.....	Mar.-April	Mar.-May	Koppel
Marland Refining Company	2	Tank	4,500g.	.....		.....	.....	.....	.....	Gen. Amer. Tank
	2	Tank	6,200g.	.....		.....	.....	.....	.....	Gen. Amer. Tank
Maryland & Pennsylvania	7	.....	.....	.....		.....	.....	.....	1928	Company Shops
Mathieson Alkali Works, Inc.	1	Tank	8,000g.	36	8½	Steel	43,700	September	October	Standard Tank
	5	Tank	30 tons	34	4½	Steel	60,600	November	.....	Standard Tank
Merrimac Chemical Co.	1	Tank	50,000	39	3⅛	Steel	80,900	November	Jan. '29	Am. Car & Fdy.
Metal & Thermit Corp.	1	Tank	30,000	28	10½	Steel	45,600	August	September	Am. Car & Fdy.
Midland Utilities of Ind.	2	Caboose	.....	.....		.....	.....	August	.....	Am. Car & Fdy.
Minneapolis & St. Louis	300	Stock	60,000	36	2	All Wood	33,700	March	1928- '29	Company Shops
Minneapolis, St. P. & S. S. Marie	200	Box	80,000	41	6	Steel Frame	42,000	March	September	Siems-Stembel
	200	Box	.....	.....		.....	.....	March	.....	Pullman
Missouri-Illinois	4	Caboose	.....	30	0	Steel Frame	45,700	June	September	Mt. Vernon Car
Missouri-Kansas-Texas	10	Dump	.....	.....		.....	.....	June	.....	W. Wh. Scraper
Missouri Pacific	100	S. S. Auto	100,000	50	6	St. Und'frame	60,400	August	November	Am. Car & Fdy.
	200	Auto	80,000	.....		St. Und'frame	.....	.....	1928	Company Shops
Montour	10	Caboose	.....	.....		.....	.....	November	.....	Standard Steel
Moss Tie Co., T. J.	1	D. S. Box	80,000	40	0	Steel Frame	.....	October	December	Mt. Vernon Car
Nat. Rosin Oil & Size Co.	1	Tank	3,600g.	22	0	Steel	34,500	August	October	Am. Car & Fdy.
Nev. Con. Copper Co.	20	Ore	60 tons	.....		.....	.....	.....	November	Koppel
	50	Ore	80 tons	.....		.....	.....	.....	November	Koppel
Newburgh & South Shore	1	Caboose	.....	.....		Steel	.....	.....	1928	Company Shops
New York Central	500	Auto-Box	110,000	40	6	All Steel	52,200	January	July	Merch. Despatch
	500	Gondola	110,000	41	6	All Steel	43,500	January	July	Merch. Despatch
	100	Gondola	.....	.....		.....	.....	December	.....	Merch. Despatch
New York, New Haven & Hartford	10	Flat	182,000	36	8	Steel	69,000	September	January	Osgood Bradley
	95	Caboose	.....	29	2¾	St. Und'frame	42,500	1928	Jan.-Dec.	Company Shops
	50	Milk	80,000	35	11	St. Und'frame	48,000	1928	Jan.-Dec.	Company Shops
	28	Flanger	.....	29	2¾	St. Und'frame	42,000	1928	Jan.-Dec.	Company Shops
Norfolk & Western	500	Box	100,000	40	6	Steel	50,700	November	Feb.-June	Company Shops
	1,000	Gondola	180,000	42	5	Steel	61,000	Jan.-Aug.	May-Dec.	Company Shops
	1,000	Hopper	115,000	30	0½	Steel	43,500	February	March	Ralston
North American Car Co.	210	Poultry	60,000	.....		Steel Frame	58,000	May	October	Standard Steel
	10	Tank	4,500g.	28	0	Steel	36,000	November	Jan. '29	Am. Car & Fdy.
	5	Tank	6,000g.	27	0	Steel	42,000	November	Jan. '29	Am. Car & Fdy.
	15	Tank	6,000g.	27	0	Steel	43,000	November	Jan. '29	Am. Car & Fdy.
North American Car Corp.	300	Refrigerator	80,000	43	9	Steel Frame	59,200	March	July	Pressed Steel
Northern Illinois Coal Corp.	6	Dump	50 cu. yd.	.....		Steel	.....	July	1929	Koppel
Northern Refrigerator Car Co.	300	Refrigerator	.....	.....		.....	.....	November	.....	Pullman
North Western Refrigerator Line	500	Refrigerator	80,000	40	0	St. Und'frame	55,000	May	August	Am. Car & Fdy.
	105	.....	.....	.....		.....	.....	.....	1928	Company Shops
Otis Steel Co.	6	Ex. Side Dump	30 cu. yd.	.....		.....	.....	January	.....	Clark Car
Pacific Electric	2	Dump	20 cu. yd.	29	0	Steel	73,800	May	August	Differential Steel
	7	Dump	20 cu. yd.	29	0	Steel	41,500	May	August	Differential Steel
Pacific Fruit Exp.	1,000	Refrigerator	80,000	39	10¾	St. Und'frame	54,300	February	June	Pullman
	1,000	Refrigerator	80,000	39	10¾	St. Und'frame	54,300	February	June	Pac. Car & Fdy.
Pacific Petroleum Prod.	5	Tank	10,000g.	28	0	Steel	43,900	April	May	Am. Car & Fdy.
Palace Poultry Car Co.	210	Poultry	60,000	36	6	Steel	58,600	May	September	Standard Steel
Panhandle Refining Co.	5	Tank	8,000	.....		.....	80,000	November	December	Gen. Amer. Tank
	5	Tank	8,000	.....		.....	80,000	November	December	Gen. Amer. Tank
Paper Makers Chemical Corp.	1	Tank	8,000g.	28	0	Steel	41,900	January	January	Am. Car & Fdy.
	2	Tank	8,000g.	28	0	Steel	41,900	November	December	Am. Car & Fdy.
	3	Tank	8,050g.	36	8½	Steel	43,400	September	October	Standard Tank
Pennsylvania	1,000	S. S. Box	100,000	40	6	All Steel	46,500	October	April '29	Company Shops
Pennsylvania Salt Mfg. Co.	2	Tank	.....	.....		.....	.....	April	.....	Gen. Amer. Tank
	4	Tank	30,000	28	10½	Steel	45,600	November	December	Am. Car & Fdy.
Phillips Petroleum Co.	1	Tank	100,000	.....		St. Und'frame	89,500	March	1928	Standard Tank
	1	Tank	100,000	.....		St. Und'frame	92,520	May	1928	Am. Car & Fdy.
	9	Tank	100,000	.....		St. Und'frame	73,100	August	1928	Am. Car & Fdy.
	3	Tank	100,000	.....		St. Und'frame	84,400	October	1928	Am. Car & Fdy.
	30	Tank	100,000	.....		St. Und'frame	69,800	August	1928	Am. Car & Fdy.
Philadelphia Quartz Co.	5	Tank	8,000g.	28	0	Steel	41,600	December	December	Am. Car & Fdy.
Pittsburgh & Shawmut	4	Caboose	60,000	23	3⅛	Steel Frame	42,200	September	December	Pressed Steel
Pittsburgh Steel Co.	3	Butt	.....	.....		.....	.....	March	.....	Pressed Steel
Protane Corp.	3	Tank	11,000g.	.....		.....	.....	March	.....	Gen. Amer. Tank
Reading	1	.....	.....	.....		Steel	66,500	January	August	Company Shops
	6	.....	.....	.....		.....	.....	.....	1928	Company Shops

Purchaser	No.	Class	Capacity	Length Ft.	Length In.	Construction	Weight	Date of Order	Date of Delivery	Builder
Richardson Refining Co.	200	Tank	8,000g.	.....		.....	.....	December	.....	Gen. Amer. Tank
Robinson, John	12	Flat	80,000	72	0	Steel	53,500	January	April	Mt. Vernon Car
	5	Stock	80,000	72	0	Steel	72,700	January	April	Mt. Vernon Car
	1	Stock	80,000	72	0	Steel	70,000	January	April	Mt. Vernon Car
Roessler & Hass Chem. Co.	5	Tank	60,000	30	0	Steel	59,700	November	January '29	Am. Car & Fdy.
	5	Tank	30-ton	34	4½	Steel	59,600	November	.....	Standard Tank
Root Refineries, Inc.	50	Tank	80,000	.....		Steel Frame	.....	October	December	Gen. Amer. Tank
Rossville Co.	5	Tank	8,000g.	28	0	Steel	40,700	May	June	Am. Car & Fdy.
Roxana Petroleum Corp.	1	Tank	10,000g.	28	0	Steel	44,800	November	December	Am. Car & Fdy.
St. Louis-San Francisco	500	Hopper	110,000	30	6	Steel	41,200	February	August	Am. Car & Fdy.
	500	Hopper	110,000	30	6	Steel	41,200	February	.....	Pullman
	500	Hopper	110,000	30	6	Steel	41,200	February	.....	Gen. Amer. Car
	500	Auto	100,000	40	8	Steel Frame	48,100	February	.....	Pullman
	500	Flat	110,000	42	1	Steel	36,700	February	.....	Gen. Amer. Car
	1,000	Box	100,000	40	8	Steel Frame	44,700	February	August	Am. Car & Fdy.
	500	Box	100,000	40	8	Steel Frame	44,700	February	.....	Gen. Amer. Car
	10	Dump	100,000	37	0	Steel	61,000	March	.....	Magor
	260	.....	.....	.....		.....	.....	.....	.....	Company Shops
St. Louis Southwestern	4	.....	.....	.....		.....	.....	.....	1928	Company Shops
Safety Car Heating & Lighting	30	Refrigerator	80,000	40	0	St. Und'frame	56,800	March	October	Am. Car & Fdy.
Sanford-Day	6	Hopper	40,000	20	0	Steel	17,500	March	August	Mt. Vernon Car
	16	Hopper	40,000	20	0	Steel	17,500	March	August	Mt. Vernon Car
Sanitary Dist. of Chicago	20	Air Dump	.....	.....		.....	.....	September	.....	Magor
Seaboard Air Line	200	Hopper	100,000	30	0	Steel	39,000	November	March	Standard Steel
Sharpless Solvent Corp.	4	Tank	6,000g.	.....		.....	.....	January	.....	Gen. Amer. Tank
Shippers Car Line	3	Tank	8,000g.	28	0	Steel	41,000	January	February	Am. Car & Fdy.
	15	Tank	8,000g.	28	0	Steel	41,000	November	November	Am. Car & Fdy.
	25	Tank	8,000g.	28	0	Steel	41,000	November	December	Am. Car & Fdy.
Skelly Oil Co.	1	Tank	10,155g.	40	0	Steel	91,200	March	June	Standard Tank
Solvay Process Co.	4	Tank	30,000	28	10½	Steel	45,600	November	December	Am. Car & Fdy.
	1	Tank	60,000	42	3	Steel	30,100	November	December	Am. Car & Fdy.
Southern	500	Auto	80,000	40	0	St. Und'frame	48,100	January	July	Am. Car & Fdy.
	20	Ex. Side Dump	30 cu. yd.	32	1	Steel	57,600	January	February	Clark Car
Southern Pacific	175	Tank	100,000	39	0¾	Steel	50,456	April	September	Gen. Amer. Tank
	250	Auto-Box	100,000	50	1⅜	Steel	61,194	April	November	T. C. I. & R. R.
	500	Flat	100,000	40	10	St. Und'frame	34,138	May	Feb. '29	Company Shops
	50	Caboose	60,000	29	7	St. Und'frame	37,150	May	Feb. '29	Company Shops
	245	.....	.....	.....		.....	.....	.....	1928	Company Shops
Southern Pacific, Tex. & La.	15	D. S. Caboose	60,000	29	7	St. Und'frame	37,000	June	January '29	Company Shops
Southern Cotton Oil Co.	10	Tank	8,000g.	28	0	Steel	44,300	June	July	Am. Car & Fdy.
	10	Tank	.....	.....		.....	.....	June	.....	Gen. Amer. Tank
Speno, Frank	1	.....	.....	.....		St. Und'frame	72,000	February	October	Am. Car & Fdy.
Standard Oil Co. of N. J.	6	Box	50-ton	40	6	Steel	46,600	April	June	Pressed Steel
Standard Transit Co.	2	Tank	6,000g.	33	8½	Steel	43,900	February	March	Standard Tank
	3	Tank	6,000g.	33	8½	Steel	44,200	April	May	Standard Tank
	1	Tank	6,000g.	33	8½	Steel	44,200	September	October	Standard Tank
	1	Tank	6,000g.	33	8½	Steel	44,200	November	November	Standard Tank
Stauffer Chemical Co.	2	Tank	8,000g.	28	0	Steel	41,000	February	March	Am. Car & Fdy.
Sun Oil Company	20	Tank	6,500g.	27	0	Steel	43,900	April	May	Am. Car & Fdy.
Swift Refrigerator Line	300	Refrigerator	.....	.....		.....	.....	November	.....	Company Shops
Symington Co.	1	Box	110,000	40	6	St. Und'frame	45,400	March	June	Am. Car & Fdy.
Texas & Pacific	500	Gondola	50-ton	41	6	Steel	45,600	January	Apr.-May	Pressed Steel
	300	Flat	100,000	42	0	Steel	38,300	January	May	Am. Car & Fdy.
	200	S. S. Auto	100,000	50	6	St. Und'frame	59,600	January	April	Am. Car & Fdy.
	10	Caboose	100,000	30	0	St. Und'frame	39,900	January	April	Am. Car & Fdy.
Texas Company	200	Tank	100,000	28	0	Steel	57,000	January	April	Am. Car & Fdy.
Timken Roller Bearing Co.	1	Hopper	170,000	46	7½	Steel	54,900	September	October	Am. Car & Fdy.
	2	Gondola	140,000	30	0	Steel	51,100	October	December	Am. Car & Fdy.
Transcontinental Oil Co.	2	Tank	6,000g.	33	8½	Steel	43,700	July	September	Standard Tank
Turner, I. M.	1	Tank	6,000g.	27	0	Steel	35,900	October	October	Am. Car & Fdy.
Union Pacific	500	Flat	100,000	40	10	St. Und'frame	34,100	February	May-June	Bettendorf
Union Refrigerator Transit	50	Refrigerator	80,000	39	0⅜	St. Und'frame	60,000	February	June	Am. Car & Fdy.
Union Starch & Ref. Co.	10	Tank	8,050g.	36	8	Steel	43,800	January	March	Standard Tank
	5	Tank	8,050g.	36	8½	Steel	43,800	September	October	Standard Tank
United States Navy Dept.	2	Gondola	50 tons	40	6	Steel	44,400	July	September	Pressed Steel
	1	Tank	.....	.....		.....	.....	July	.....	Gen. Amer. Tank
United Sugar Co.	8	Cane	80,000	45	0	Steel	41,000	June	August	Standard Steel
Valvoline Oil Co.	10	Tank	8,000g.	36	8½	Steel	40,800	June	June	Standard Tank
Virginia Smelting Co.	4	Tank	60,000	42	3	Steel	30,100	April	May	Am. Car & Fdy.
Virginian	1,000	Hopper	110,000	32	9	All Steel	43,000	May	Sept.-Dec.	Va. Bridge & Iron
	500	Hopper	60 tons	.....		.....	.....	December	.....	Va. Bridge & Iron
Wabash	10	Hopper	110,000	30	6	Steel	41,100	August	November	Am. Car & Fdy.
	1,500	Auto	80,000	40	6	St. Und'frame	47,000	November	April '29	Am. Car & Fdy.
	500	Auto	.....	.....		.....	.....	November	.....	Pullman
	35	S. S. Auto	40 tons	.....		.....	.....	December	.....	Am. Car & Fdy.
Warner Chemical Co.	1	Tank	8,000g.	28	0	Steel	41,600	July	August	Am. Car & Fdy.
	1	Tank	8,000g.	28	0	Steel	41,600	November	December	Am. Car & Fdy.
Warner Quinlan Co.	10	Tank	10,000g.	28	0	Steel	44,700	October	November	Am. Car & Fdy.
	1	Tank	6,000g.	27	0	Steel	35,900	October	November	Am. Car & Fdy.
	10	Tank	10,000g.	.....		.....	.....	November	.....	Gen. Amer. Tank
Waverly Oil Works Co.	1	Tank	6,000g.	33	8½	Steel	44,200	September	October	Standard Tank
	8	Tank	80,000	32	6½	Steel	40,600	June	July	Am. Car & Fdy.
Western Fruit Express Co.	19	Refrigerator	75,000	33	2¾	St. Und'frame	55,000	Nov. '27	1928	Company Shops
	21	Refrigerator	75,000	33	2¾	St. Und'frame	55,000	October	1928	Company Shops
Western Maryland	150	Gondola	100,000	61	0	Steel	65,000	September	December	Bethlehem
Western Paper Makers Chem. Co.	9	Tank	8,050g.	36	8½	Steel	43,600	February	February	Standard Tank
Western Pacific	8	Caboose	.....	.....		St. Und'frame	.....	.....	1928	Company Shops
	2	Flat	.....	.....		.....	.....	.....	1928	Company Shops
Wetmore & Morse Granite Co.	3	Dump	100,000	20	0	Steel	56,500	August	October	Laconia
Wheeling Steel Corp.	4	Dump	20 cu. yd.	25	8	Steel	53,800	February	February	Koppel
	12	Dump	30 cu. yd.	33	3	Steel	75,000	February	February	Koppel
White Eagle Oil & Refining Co.	15	Tank	8,000g.	36	0	Steel	60,000	May	July	Penn. Car
Wine Railway Appliance Co.	1	Hopper	140,000	38	0	Steel	50,400	January	May	Ralston Steel
Youngstown Sheet & Tube	17	Dump	35 cu. yd.	.....		Steel	.....	November	1929	Koppel

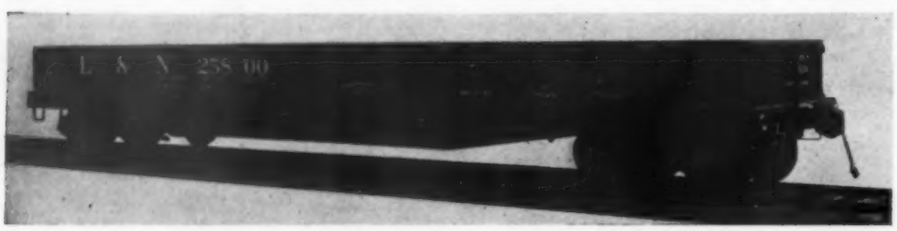
Canada

Purchaser	No.	Class	Capacity	Length Ft.	Length In.	Construction	Weight	Date of Order	Date of Delivery	Builder
Canadian National	715	Ballast	50 tons	.....		Steel Frame	.....	1928	.....	Eastern Car
	500	Refrigerator	40 tons	.....		St. Und'frame	.....	1928	.....	Eastern Car
	1,600	Box	.....	.....		.....	.....	November	.....	Can. Car & Fdy.
	30	Tank	.....	.....		.....	.....	November	.....	Can. Car & Fdy.
	750	Box	100,000	40	0	Steel Frame	.....	November	April '29	National Steel
	300	Flat	100,000	46	1	Steel Frame	.....	November	April '29	National Steel
	25	Ballast	100,000	40	0	Steel Frame	53,000	April	July	National Steel
	5	Ballast	100,000	40	0	Steel Frame	53,000	July	August	National Steel
	115	Ballast	50 tons	40	0	.....	53,700	March	June	Can. Car & Fdy.
Canadian Pacific	50	Ballast	.....	.....		.....	.....	January	.....	Can. Car & Fdy.
	300	S. S. Auto	80,000	40	6	Steel Frame	48,900	January	June	Can. Car & Fdy.
	200	Refrigerator	80,000	39	11⅞	St. Und'frame	64,380	January	June	National Steel
	15	Horse	80,000	46	0	Steel	57,200	January	April	National Steel
	250	Frt.-Ref.	80,000	40	0	St. Und'frame	.....	November	Feb. '29	National Steel
	200	D. S. Auto	80,000	40	6	Steel	.....	November	Feb. '29	National Steel

Purchaser	No.	Class	Capacity	Length Ft.	Length In.	Construction	Weight	Date of Order	Date of Delivery	Builder
Canadian Pacific (continued)	1,000	D. S. Box	100,000	40	6	Steel	.....	November	July	National Steel
	40	Caboose	.....	.....		.....	.....	May	.....	Company Shops
	275	Ballast	.....	.....		.....	.....	November	.....	Can. Car & Fdy.
	300	Flat	40 tons	41	8	.....	.....	1928	.....	Eastern Car
	300	Coal	75 tons	.....		St. Und'frame	.....	1928	.....	Eastern Car
	1,500	Box	.....	.....		.....	.....	November	.....	Can. Car & Fdy.
	200	.....	40 ton	39	7½	St. Und'frame	42,000	November	May '29	Can. Car & Fdy.
Canadian Steel Foundry	5	Flat	40 ton	42	5¾	St. Und'frame	34,600	July	July	Can. Car & Fdy.
Imperial Oil Co.	50	Tank	6,700g.	32	4½	Steel	47,000	November	Jan. '29	Can. Car & Fdy.
	75	Tank	8,000g.	38	1	Steel	48,000	November	Jan. '29	Can. Car & Fdy.
	100	Tank	10,000g.	37	1	Steel	54,000	November	Jan. '29	Can. Car & Fdy.
International Paper	1	Flat	100 ton	39	8	Steel	81,400	March	May	Can. Car & Fdy.

Export

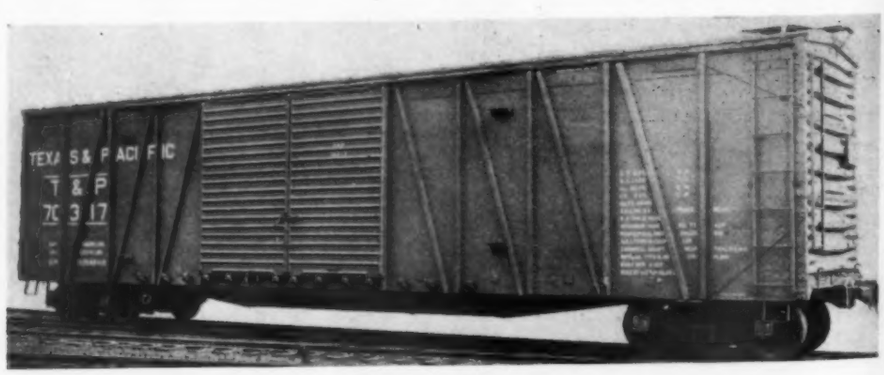
Purchaser	No.	Class	Capacity	Length Ft.	Length In.	Construction	Weight	Date of Order	Date of Delivery	Builder
Amtorg Trading Corp.	20	Air Dump	30 cu. yd.	.....		.....	.....	1928	.....	Magor
Argentine State	500	.....	.....	.....		.....	.....	1928	.....	Am. Car & Fdy.
	600	.....	.....	.....		.....	.....	1928	.....	Standard Steel
International Railways	10	Banana	.....	38	4	Steel Frame	20,833	March	May	Magor
	25	Banana	12 tons	38	4	Steel Frame	20,789	July	October	Magor
	50	Gondola	20 tons	.....		Steel Frame	17,000	April	July	Magor
	25	Flat	20 tons	.....		Steel Frame	17,000	April	July	Magor
	150	Box	25 tons	36	0	Steel Frame	.....	August	Octol er	Gregg
Mukden-Hailung	100	.....	.....	.....		.....	.....	1928	.....	Pressed Steel
Paulista Railway	750	.....	.....	.....		.....	.....	1928	.....	Standard Steel
	250	.....	.....	.....		.....	.....	1928	.....	Am. Car & Fdy.
United Fruit Co.	50	Cane	20 tons	.....		.....	.....	December	.....	Magor



Capacity, 50 tons
Light weight, 47,900 lb.
Load limit, 121,100 lb.
Inside length, 45 ft.
Inside width, 8 ft. 11 in.
Built, June, 1928

Composite Mill Gondola, Built by the Mt. Vernon Car Manufacturing Company

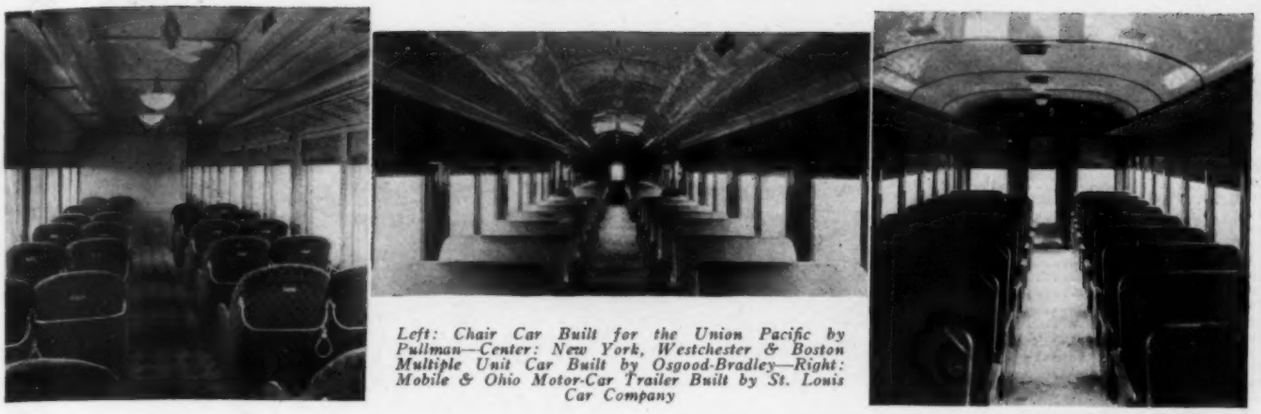
Capacity, 50 tons
Light weight, 59,700 lb.
Load limit, 104,300 lb.
Inside length, 50 ft. 6 in.
Inside width, 9 ft.
Built, April, 1928



Single Sheated Box Car Built by the American Car & Foundry Company

Capacity, 50 tons
Light weight, 48,400 lb.
Load limit, 120,600 lb.
Inside length, 41 ft.
Cubic capacity, 1,896 cu. ft.
Built, October, 1928

Composite Gondola Built by the Ryan Car Company



Left: Chair Car Built for the Union Pacific by Pullman—Center: New York, Westchester & Boston Multiple Unit Car Built by Osgood-Bradley—Right: Mobile & Ohio Motor-Car Trailer Built by St. Louis Car Company

Passenger Car Orders in 1928

Orders for passenger train cars show increased totals for United States—Also for Canada

By M. L. Leath
Associate Editor, *Railway Age*

ORDERS placed during 1928 for passenger train cars for service in United States totaled 1,930 or about 300 more than the 1927 total of 1,612. Even though the 1928 total was above those of 1927 and 1926 it was nevertheless, with these two exceptions the poorest year of the past seven. These orders, however have not varied from those of the normal pre-war years, nor from those of the good years following the war, to the same extent as did orders for other classes of rolling stock. The foregoing figures do not include orders for rail motor cars which orders are presented and discussed in a separate article.

Table I—The Passenger Car Orders of 1928

For service in the United States	1,930
For service in Canada	334
For export to other countries	29
Grand total	2,293

Passenger train car orders placed during 1928 by Canadian roads for service in Canada totaled 334 and thus reached a high point for the past nine years since 1919. These Canadian orders amounted to 143 during 1927 and 236 during 1926.

Export orders, however, dropped during 1928 to 29 from a 1927 total of 48. The 1926 export total was 58.

Passenger train cars built for domestic service in the United States, totaled 1,356 as compared with a 1927 production of 1,785. This 1928 production figure is the lowest of the past six years. It is necessary to point out with regard to passenger cars, just as it was with locomotives and freight cars, that it is well to keep in mind the distinction between cars ordered and cars built when considering equipment statistics.

Table II—Orders for Passenger Cars Since 1901

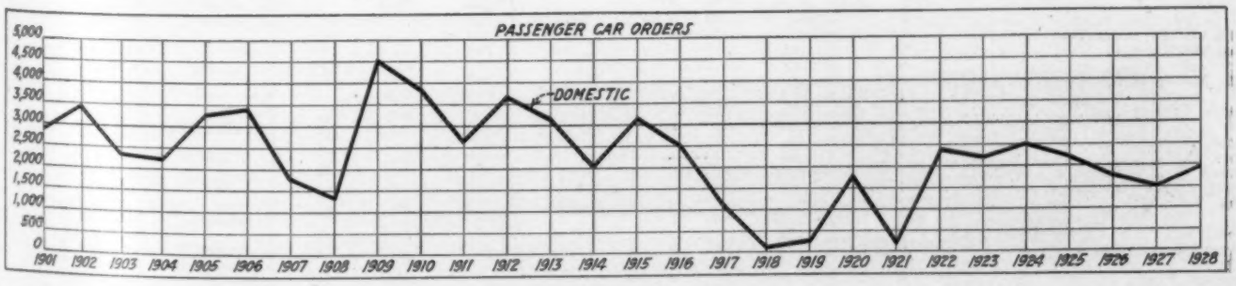
Domestic Orders Only

Year	Passenger cars	Year	Passenger cars
1901	2,879	1909	4,514
1902	3,459	1910	3,881
1903	2,310	1911	2,623
1904	2,213	1912	3,642
1905	3,289	1913	3,124
1906	3,402	1914	1,674
1907	1,791	1915	1,978
1908	1,319		

Domestic and Foreign

Year	Domestic	Canadian	Export	Total
1916	2,302	...	109	2,411
1917	1,124	...	43	1,167
1918	9	22	26	57
1919	292	347	143	782
1920	1,781	275	38	2,094
1921	246	91	155	492
1922	2,382	87	19	2,488
1923	2,214	263	6	2,483
1924	2,554	100	25	2,679
1925	2,191	50	76	2,317
1926	1,868	236	58	2,162
1927	1,612	143	48	1,803
1928	1,930	334	29	2,293

The tendency of passenger car buying to hold up in the face of the drastically curtailed purchases of other classes of rolling stocks is no doubt due to the fact that the railways are continuing their efforts to present a more attractive passenger service and thus hope to check the large losses of this class of traffic.



Passenger Car Orders, 1901 to 1928

Table III—Passenger Cars Built in 1928

	United States	Canada	Total
Domestic	1,356	237	1,593
Foreign	15	...	15
	1,371	237	1,608

Comparison with Previous Years

Year	Domestic	Foreign	Total
1899	1,201	104	1,305
1900	1,515	121	1,636
1901	1,949	106	2,055
1902	From 1902 to 1907		1,948
1903	passenger car figures		2,007
1904	in these two columns		2,144
1905*	included in corre-		2,551
1906*	sponding freight car		3,167
1907*	columns.		5,457
1908*	1,645	71	1,716
1909*	2,698	151	2,849
1910*	4,136	276	4,412
1911*	3,938	308	4,246
1912†	2,822	238	3,060

* Includes Canadian output.
† Includes Canadian output and equipment built in company shops.

	United States			Canadian			
Year	Domestic	Foreign	Total	Domestic	Foreign	Total	Grand total
1913	2,559	220	2,779	517	....	517	3,296
1914	3,310	56	3,366	325	....	325	3,691
1915	1,852	14	1,866	83	....	83	1,949
1916	1,732	70	1,802	37	....	37	1,839
1917	1,924	31	1,955	45	....	45	2,000
1918	1,480	92	1,572	1	....	1	1,503
1919	306	85	391	160	....	160	551
1920	1,272	168	1,440	....	....	....	....
1921	1,275	39	1,314	361	....	361	1,675
1922	676	144	820	71	....	71	891
1923	1,507	29	1,536	....	....	....	....
1924	2,150	63	2,213	167	....	167	2,380
1925	2,363	50	2,413	....	....	....	....
1926	2,184	102	2,286	285	....	285	2,571
1927	1,785	50	1,835	126	....	126	1,961
1928	1,356	15	1,371	237	....	237	1,608

The buying of passenger cars developed no regular trend during the year and wide fluctuations occurred in the monthly totals. The biggest month of the year was January, when 615 were ordered. Orders then fell off to 82 in February and 45 in March, rising again to 142 in April and 153 in May. The other big month was August, when a total of 589 passenger train cars were ordered.

P. R. R. Orders Over Half of Total

The Pennsylvania was the largest single purchaser of passenger train cars during the year. Its two large orders, one for 600 cars, placed in January and the second for 550 cars, placed in August, were two of the largest passenger car orders on record. Also these purchases of the Pennsylvania, totaling 1,150 cars, account for more than one-half of all 1928 domestic passenger train car orders. These large orders were placed in carrying out the plans of this road to replace all wooden cars with steel equipment on all regular passenger trains throughout the system. These Pennsylvania purchases compare with the New York Central's purchase of 195 cars as the largest 1927 order.

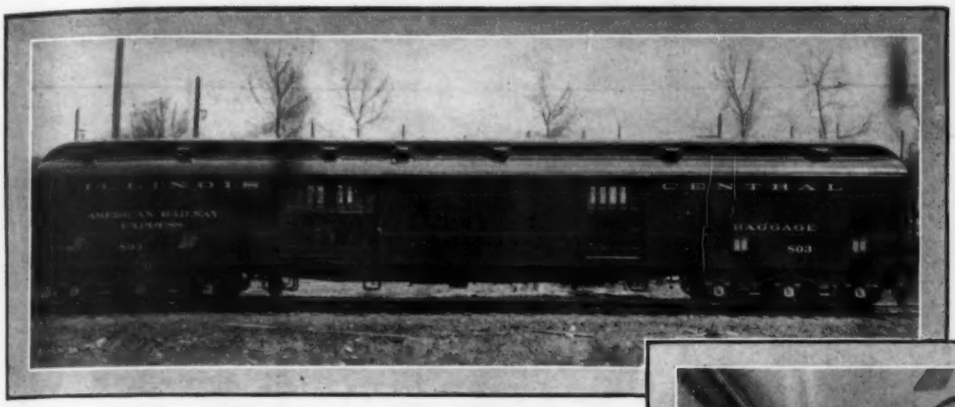
The list of orders which follow are compiled in the usual manner, returns from the railroad being checked with and amplified from lists of orders furnished by the builders, largely through the co-operation of the American Railway Car Institute and from the weekly reports of orders in the Equipment and Supplies column of the *Railway Age*.

In the appended tabulation construction is assumed to be all-steel and exceptions are noted.

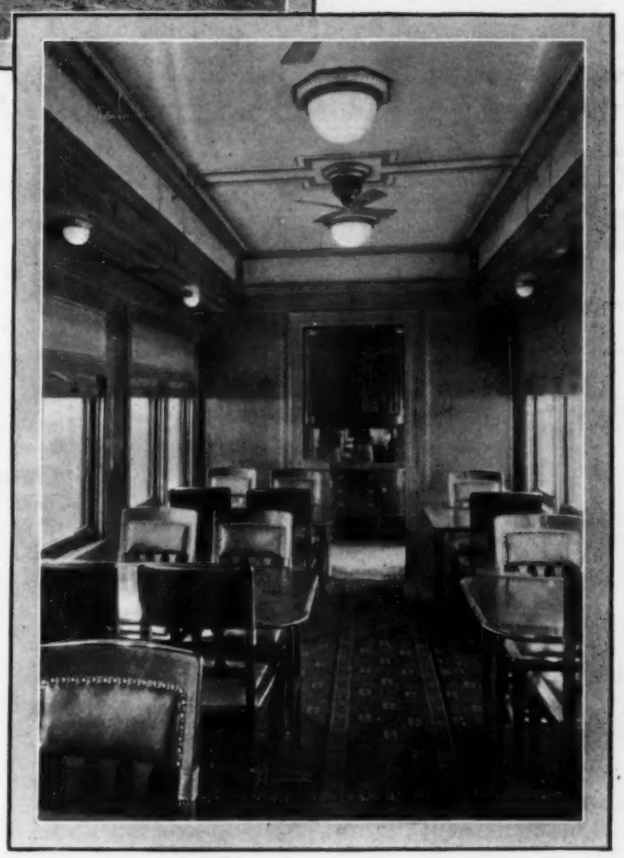
Passenger Car Orders in 1928

For Service in the United States

Purchaser	No.	Class	Length Ft.	Length In.	Seating Capacity	Weight	Date of Order	Date of Delivery	Builder
Atchison, Topeka & Santa Fe	1	Business	73	6	..	180,500	.....	.....	Pullman
Bangor & Aroostook	2	Bagg. & Mail	73	3⅝	..	120,000	September	.....	Osgood Bradley
	1	Official	82	10½	..	192,000	March	November	Pullman
Baltimore & Ohio	6	Bagg. & Mail	70	0	..	139,800	May	October	Am. Car & Fdy.
	4	Bagg. & Mail	70	0	..	138,600	May	October	Am. Car & Fdy.
	1	Business	75	5	..	185,000	.....	.....	Pullman
Block, Paul	1	Private	75	5	..	182,000	.....	.....	Pullman
Boston & Albany	10	Coach	70	0	88	130,000	April	November	Pullman
	3	Combination	70	0	48	127,000	April	December	Osgood Bradley
Canadian National Lines in U. S.	3	Bagg. & Mail	.....		..	.....	August	.....	Am. Car & Fdy.
Chesapeake & Ohio	2	Dining	.....		..	.....	December	.....	Pullman
Chicago & Alton	3	Bagg. & Mail	70	9	..	.....	June	December	Pullman
Chicago & Eastern Illinois	2	Mail & Smok.	81	5¼	56	157,500	January	May	Pullman
Chicago, Burlington & Quincy	9	Baggage	72	0	..	141,500	February	September	Pullman
	20	Coaches	80	0	100	100,400	October	1929	Company Shops
Chicago Great Western	3	Bagg. & Mail	64	2	..	115,000	July	November	Pullman
Chicago, Milwaukee, St. P. & Pacific	10	Baggage	72	0	..	133,500	May	December	Company Shops
Chicago, Rock Island & Pacific	10	Suburban	70	0	98	96,500	March	August	Standard Steel
	10	Coaches	74	6	80	145,500	March	August	Pullman
	10	Baggage	70	0	..	134,200	March	Aug.-Sept.	Am. Car & Fdy.
	6	Bagg. & Mail	70	0	..	140,700	March	September	Am. Car & Fdy.
	5	Horse Exp.	74	2	..	147,000	May	Oct.-Nov.	Am. Car & Fdy.
	4	Parlor-Obs.	80	6	42	165,000	March	Dec.-Jan.	Pullman
Chicago, South Shore & So. Bend	10	M. U. Motor	61	0	48	.....	May	December	Standard Steel
	5	Motor	61	0	48	.....	October	May	Standard Steel
	5	Trailer	61	0	50	.....	October	May	Standard Steel
Cleve., Cincinnati, Chicago & St. L.	20	Baggage	70	0	..	138,500	April	September	Am. Car & Fdy.
Delaware & Hudson	3	Mail & Bagg.	63	7⅞	..	119,700	July	November	Am. Car & Fdy.
	1	Dining	.....		..	.....	.....	1928	Company Shops
Delaware, Lackawanna & Western	1	Mail	64	5	..	116,000	April	August	Am. Car & Fdy.
	2	Dining	81	0	36	160,000	October	.....	Pullman
Erie	25	Coach	66	0	111	101,500	May	December	Standard Steel
	5	Bagg. & Mail	70	0	..	140,000	May	December	Pullman
	5	Bagg. & Exp.	70	0	..	127,500	May	December	Pullman
	2	Dining	80	0	36	169,100	September	September	Pullman
Gavit, E. P.	1	Private	75	5	..	182,000	.....	.....	Puilman
Great Northern	4	Heater	43	8	..	88,700	January	April	St. Louis Car
	6	Dining	.....		..	.....	December	.....	Pullman
Gulf, Mobile & Northern	3	Coach	78	5¾	84	141,000	Apr.-May	July	Am. Car & Fdy.
	3	Bagg. & Mail	73	9½	..	135,000	Apr.-May	July	Am. Car & Fdy.
Illinois Central	10	Sub. Motor	60	6	84	141,200	April	Dec.-Jan.	Pullman
	10	Sub. Trailer	60	6	84	88,600	April	Dec.-Jan.	Pullman
James, A. C.	1	Private	75	9	..	185,000	.....	.....	Pullman
Jones, E. W.	1	Private	75	8	..	180,000	.....	.....	Pullman
Kansas City Southern	1	Business	75	5	..	185,000	.....	.....	Pullman
Kenny Co., W. F.	1	Private	74	10	..	185,000	.....	.....	Pullman
Long Island	10	Baggage	63	2	..	101,300	July	October	Am. Car & Fdy.
	2	Bagg. & Mail	63	2	..	102,000	August	December	Am. Car & Fdy.
Minn., St. P., Sault Ste. Marie	8	Bagg. & Smok.	.....		..	.....	February	.....	Pullman
Missouri-Kansas-Texas	6	Bagg. & Mail	70	0	..	137,700	July	December '29	Am. Car & Fdy.
	13	Bagg. & Mail	70	0	..	137,700	July	January '29	Am. Car & Fdy.
Missouri Pacific	1	Office	86	4	..	.....	April	Mar. '29	Pullman
	1	Office	86	4	..	186,300	April	Jan. '29	Am. Car. & Fdy.
Mobile & Ohio	1	Bagg. & Mail	64	5	..	117,500	January	June	Bethlehem Steel
Nashville, Chattanooga & St. Louis	2	Baggage	72	6	..	135,300	January	July	Am. Car & Fdy.
	2	Pass. & Bagg.	76	0	36	143,500	January	July	Am. Car & Fdy.

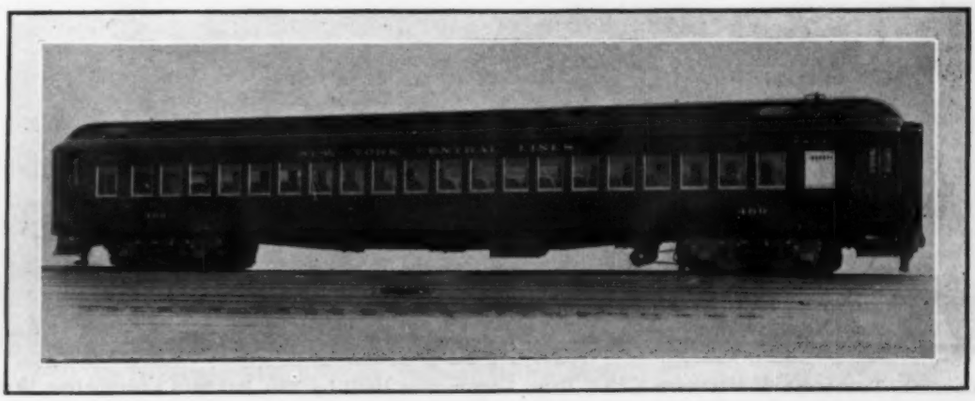


Left—A 70-ft. Baggage and Express Car Built by the St. Louis Car Company for the Illinois Central—Weight, 133,-200 lb.



Below—Interior of a Baggage and Express Car Built by the American Car & Foundry Company for the Nashville, Chattanooga & St. Louis

Above—Interior of a Dining Car Built for the Western Pacific by the Pullman Car & Manufacturing Corporation



Right—A Pittsburgh & Lake Erie Coach Built by the Pressed Steel Car Company

Purchaser	No.	Class	Length Ft.	Length In.	Seating Capacity	Weight	Date of Order	Date of Delivery	Builder
New York Central	10	Baggage	63	3¾	..	111,300	April	January '29	Osgood Bradley
	14	Horse	73	0¾	..	142,300	April	November	Am. Car & Fdy.
	5	Horse	73	0¾	..	142,000	April	December	Pullman
	6	Dining	82	2½	36	172,600	April	November	Pullman
	30	Milk	52	3¾	..	85,300	April	December	Merch. Despatch
	10	M. U. Coach	69	4½	100	127,700	April	April	Standard Steel
New York, Chicago & St. Louis	1	Business	.....		..	.....	February	.....	Pullman
Northwestern Pacific	5	M. U. Coach	71	0½	98	116,000	November	Mar. '29	St. Louis Car
	5	M. U. Trailer	71	0½	103	67,000	November	Mar. '29	St. Louis Car
Peoria & Eastern	4	Coaches	70	0	80	131,000	.....	.....	Pullman
Pennsylvania	150	Coaches	79	10½	80	130,000	January	December	Standard Steel
	88	Coaches	79	10½	80	130,000	January	Jan. '29	Bethlehem
	50	Coaches	79	10½	80	130,000	January	December	Pressed Steel
	12	Coaches	79	10½	80	130,000	January	Jan. '29	Company Shops
	75	Bagg. & Exp.	63	2	..	101,300	January	August	Am. Car & Fdy.
	50	Bagg. & Exp.	63	2	..	101,300	January	November	J. G. Brill
	85	Bagg. & Exp.	63	2	..	101,300	January	December	St. Louis Car
	45	Bagg. & Exp.	73	7¾	..	120,500	January	December	Company Shops
	25	Horse Exp.	77	9¾	..	132,000	January	November	Company Shops
	20	Pass. & Bagg.	77	3½	40	129,000	January	Mar. '29	Company Shops
	200	Refrig. Exp.	54	2	..	95,000	July	Mar. '29	Am. Car & Fdy.
	200	Refrig. Exp.	54	2	..	95,000	July	Mar. '29	Pressed Steel
	100	Refrig. Exp.	54	2	..	95,000	July	Mar. '29	Pullman
	50	Refrig. Exp.	54	2	..	95,000	July	Mar. '29	Gen. Amer. Car
Pittsburgh & Lake Erie	5	Coach	70	0	84	129,700	April	November	Pressed Steel
	1	Business	74	0	..	175,000	May	November	Pullman
Pullman Company	220	Sleeping	.....		..	.....	.....	.....	Pullman
	6	Observation	.....		..	.....	.....	.....	Pullman
	12	Bagg.-Club	.....		..	.....	.....	.....	Pullman
Richmond, Fredericksburg & Potomac	1	Cafe-Parlor	83	1	36	172,000	May	December	Pullman
Rutland	3	Mail & Bagg.	72	9	..	141,000	May	December	Osgood Bradley
St. Louis-San Francisco	5	Baggage	70	0	..	131,100	February	July	Am. Car & Fdy.
	15	Mail & Bagg.	70	0	..	136,500	February	July	Am. Car & Fdy.
Schlesinger, Mrs. E.	1	Private	75	5	..	182,000	.....	.....	Pullman
Shedd Acquar. Soc.	1	Acqu. car	83	0	..	158,000	.....	.....	Pullman
Southern Pacific	10	Baggage	73	6¾	..	124,220	May	November	Standard Steel
	15	Coach	82	2⅞	88	150,000	May	November	Am. Car & Fdy.
	6	Dining	80	5½	36	160,500	May	Jan. '29	Pullman
	25	Dining	80	5½	36	160,500	October	Apr. '29	Pullman
Southern Pacific, Tex. & La.	10	Coach	82	3	88	141,000	May	December	Am. Car & Fdy.
	5	Compt. Coach	81	3	86	143,000	May	December	Pullman
	6	Bagg. & Mail	73	0	..	132,000	May	December	Bethlehem Steel
Texas & Pacific	5	Bagg. & Exp.	72	3	..	130,000	January	June	Am. Car & Fdy.
	3	Dining	80	10	36	169,100	January	September	Am. Car & Fdy.
	2	Business	.....		..	186,300	January	December	Am. Car & Fdy.
Western Pacific	4	Cafe-Coach	81	5½	58	159,900	January	May	Pullman
Widener, Joseph	1	Private	76	3	..	183,000	.....	.....	Pullman
Union Pacific	10	Dining	83	0	36	159,300	February	September	Pullman
	15	Coach	83	0	72	146,800	February	Sept. & Oct.	Pullman

Canada

Purchaser	No.	Class	Length Ft.	Length In.	Seating Capacity	Weight	Date of Order	Date of Delivery	Builder
Canadian National	20	Colonist	82	4½	72	159,700	January	October	National Steel
	12	Box-Bagg.	48	8¾	..	83,100	March	June	National Steel
	25	Coach	80	4½	80	.....	November	Apr. '29	National Steel
	2	Bagg. & Smok.	82	4½	40	.....	November	Apr. '29	National Steel
	10	Buffet-Parlor	.....		..	.....	November	.....	Can. Car & Fdy.
	30	Sleeping	.....		..	.....	November	.....	Can. Car & Fdy.
	5	Cafe-Parlor	.....		..	.....	March	.....	Can. Car & Fdy.
	2	Obs.-Sleep.	.....		..	.....	March	.....	Can. Car & Fdy.
	30	Colonist	.....		..	.....	March	.....	Can. Car & Fdy.
Canadian Pacific	5	Comp. Sleeper	75	6	35	180,000	December '27	June	Company Shops
	3	Buff. Sleeper	75	6	40	181,000	December '27	May	Company Shops
	5	Cafe-Parlor	78	0½	30	180,500	January	June	Company Shops
	6	Night Sleeper	75	6	..	180,000	May	August	Company Shops
	3	Business	60	8	..	169,500	July	December	Company Shops
	10	Coach-Smok.	75	6	82	164,000	January	June	Company Shops
	10	Coach-Smok.	75	6	88	164,000	January	June	Company Shops
	15	Dining	83	10½	36	.....	November	Jan. '29	National Steel
	15	Coach	83	10½	82	.....	November	Jan. '29	National Steel
	2	Cafe-Parlor	83	10½	37	.....	November	Feb. '29	National Steel
	2	Sleeping	.....		..	.....	November	Mar. '29	National Steel
	29	Sleeping	.....		..	.....	November	.....	Can. Car & Fdy.
	11	Buffet-Parlor	.....		..	.....	November	.....	Can. Car & Fdy.
	†50	Exp. Refrig.	48	8¾	..	.....	November	April '29	National Steel
	10	Baggage	83	10½	..	.....	November	.....	Can. Car & Fdy.
	11	Mail & Expr.	83	10½	..	160,000	November	.....	Can. Car & Fdy.
	6	Baggage	83	10½	..	155,000	December	.....	Can. Car & Fdy.
Newfoundland	2	Sleeping	59	10½	36	89,340	January	September	National Steel
Sydney & Louisburg	1	Express	42	0	..	52,000	May	November	Company Shops

Export

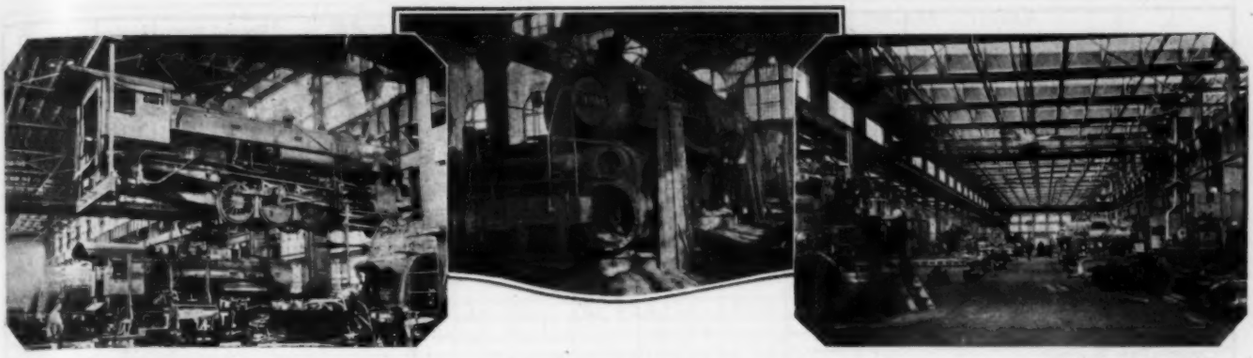
Purchaser	No.	Class	Length Ft.	Length In.	Seating Capacity	Weight	Date of Order	Date of Delivery	Builder
Central of Brazil	12	Sleeping	.....		..	.....	May	.....	Am. Car & Fdy.
	3	Buffet	.....		..	.....	May	.....	Am. Car & Fdy.
Paulista Railway of Brazil	7	.....	.....		..	.....	June	.....	Am. Car & Fdy.
	5	.....	.....		..	.....	June	.....	Am. Car & Fdy.
	2	Sleeping	78	3½	20	142,000	June	.....	Osgood Bradley

† Steel Underframe.

* * * *

Tr. force, 49,000 lb.
Wt., engine, 214,300 lb.
Wt., drivers, 189,300 lb.
Cyls., 24 in. by 28 in.
Drivers, 56 in.
Pressure, 200 lb.
Evap. h. s., 2,343 sq. ft.
Superheater, 553 sq. ft.
Grate, 54.3 sq. ft.

Alabama, Tennessee & Northern 2-10-0 Type Locomotive Built by The Baldwin Locomotive Works



Machine Tools Ordered During 1928

An increased amount of shop equipment ordered last year, as compared with 1927

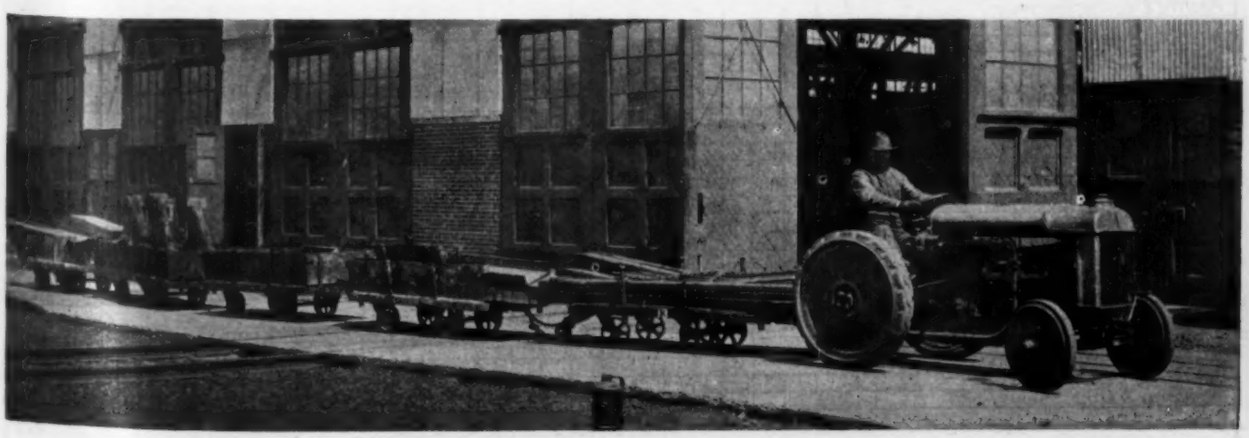
By L. R. Gurley
Associate Editor, *Railway Age*

THE outstanding trend indicated by the machine tool and shop equipment orders placed during 1928, is the marked increase in the purchase of material handling equipment, including cranes, several types of hoists and power trucks. During 1928, 87 railroads, representing 85 per cent of the route mileage of the continent, placed orders for machine tools and shop equipment that totaled 2,377 units. The orders reported in 1927 by 99 railroads in the United States and Canada, which represented 88 per cent of the total route mileage, totaled 2,172 units, which gives an increase of 205 units ordered during 1928, with 7 less railroads reporting.

Since no new repair shops of any size were built during 1928, it is safe to assume that most of the tools and equipment ordered were for the replacement of obsolete machine tools, or as supplementary tools to those already in service. One road in particular, which reports an extensive list of machine tools ordered during 1928, has completed during the past year a rehabilitation program which has eliminated all machine tools at the main shops that have been in service more than ten years. This trend toward the elimination of obsolete machine tools in the larger shops is further indicated by the fact that most of the railroads reporting large orders of machine tools have not built new shops during the past year. As this trend toward machine tool modernization is by no means diminishing or nearly carried out to completion, it is safe to predict that machine tool orders for 1929 will compare favorably with 1928, if not better.

Trends of Five Years

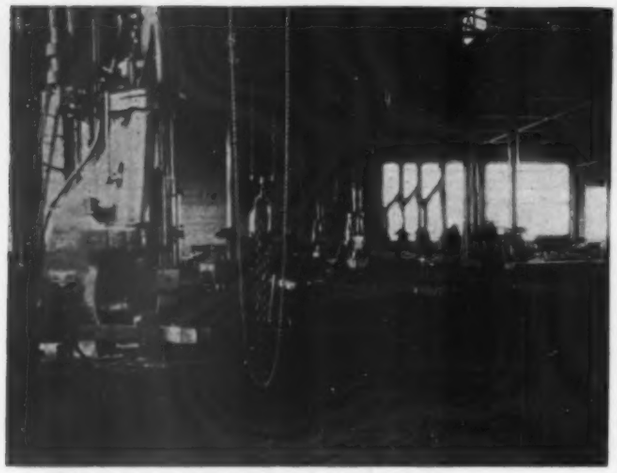
The data available for five years indicate some interesting trends in the types of machine tools purchased by the railroads. The tables show that lathes are by far the most widely used in railroad shops. The total number of axle, engine, turret and wheel lathes ordered during 1927 to 1928, inclusive, were 363, 310, 395, 223 and 192, respestively, of which approximately 62 per cent were engine lathes. During the same period the orders placed for drilling machines numbered 124, 179, 296, 140 and 94, of which approximately 32 per cent were of the radial type. The total numbers of planers, shapers and slotters, standard equipment in any railroad shop, ordered during 1925 to 1928, inclusive, were 127,



An Important Facility in the Railway Repair Shop

Purchaser	Lathes				Drill Presses		Planers	Shapers	Slotters	Boring Mills		Milling Machines		Grinding Machines			Metal Cutting Saws	Portable Boring, Facing and Turning Machines	Bolt Cutters and Threaders	Pipe Cutters and Threaders	Presses		Hammers		Forging Machines		Punches	Shears	Combination Punch and Shear
	Axle	Engine	Turret	Wheel	Radial	Vertical and others				Horizontal	Vertical and others	Universal	Horizontal and others	Cylindrical	Internal	Surface	Double End Tool and others					Wheel	Others	Steam	Other Power	Bulldozers	Others			
Akron, Canton & Youngstown																1													
Ann Arbor							1									1													
Atchison, Topeka & Santa Fe	1	12	2		2	1	1	1		1	3		1	1	2	11	2		2			2	1						1
Atlantic Coast Line																													
Baltimore & Ohio							No Report Received																						
Bangor & Aroostook										1				1		1													
Belt Railway Company of Chicago		1						1																					
Boston & Albany	1	5	2		2	2		1	1	1	3				1	1	5	1	1		2			3			1		1	
Bessemer & Lake Erie	1	3			1		1										3	1		1									
Boston & Maine		2				3							1		1		3		1	1		3		1			2	2	
Canadian Pacific	2	1		2	2	5	1	1		1	1	2	2			1	4	4	1	2	3		6					3	
Charleston & Western Carolina																													
Central of New Jersey		1			1		1	2									3	1	2	1	2	1	1	1					1
Chesapeake & Ohio	2	1				2												1	1	1									
Chicago, Burlington & Quincy	1	3			1	1		2			2			1			7	1	3		1						1	4	
Chicago & Illinois Midland	1																1			1				1					
Chicago Great Western													1						1										
Chicago, Indianapolis & Louisville																	1												
Chicago & North Western	1	1				1		1				1					7	1			1	1	2					3	
Chicago, Milwaukee, St. Paul & Pacific		1												1			3	3				3	1				1	3	1
Chicago River & Indiana																	1												
Chicago, Rock Island & Pacific		4	1		1	4			3		1			2	1		2			1	1					1	2	1	
Chicago, St. Paul, Minn. & Omaha		1	1													1	3												
Colorado & Southern	1																												
Clev., Cin., Chicago & St. Louis			1																2	1				1					
Delaware & Hudson																				1									
Delaware, Lackawanna & Western		3			1	1								1	1	1	4	2				2	1				1	2	
Denver & Rio Grande Western																													
Dominion Atlantic				1																									
Donora Southern		1																											
Elgin, Joliet & Eastern																1													
Erie								2											1		1								
Ft. Worth & Denver City	1																			1									
Escanaba & Lake Superior		1																											
Great Northern					1						2					5				1			2						
Gulf, Mobile & Northern																													
Gulf Coast Lines		2			1	1		1						1		6	1	1						1					1
Hocking Valley			1					1			2					1													1
Illinois Central	1										1					1													
International-Great Northern				1			1													1				1				1	
Lake Superior & Ishpeming							1				1																		
Lehigh Valley						1					2		2	2	1				1										
Lehigh & New England			1																										
Los Angeles & Salt Lake														1															
Louisville & Nashville		2	1	1							2					2	1					1						1	
Maine Central		1					1		1		1					2				1									
Michigan Central	3	2	2	1	1	5		1			2			1	1	8	2		1	2				2			2	2	
Minneapolis & St. Louis		1																				1							
Minn., St. Paul & Sault Ste Marie																													
Missouri-Kansas-Texas	4	2	1		1	2					2					13			2	2		3							
Missouri Pacific		12	5		8	7		3		1	4		3		1	17		2	6	4		3	1	2				2	1
Monongahela														1															
Nashville, Chattanooga & St. Louis			1			1								1		7	1	1										1	
New Jersey, Indiana & Illinois								1																					
New York Central	2	12	5	1		6		6			1	2	6		3	1	28	2	1	4	4	1	4	1	1			5	
New York, Chicago & St. Louis																	1												
New York, New Haven & Hartford		2						1					1					3					1				1		
New York, Westchester & Boston																													
Norfolk Southern																2						1							
Norfolk & Western	1	8	6			6	2	3		1	4		3	10	3	1	18		3		1		6		5		1		1
Northern Pacific		2	1		1			1			2				1		11	1		1	1		2					3	3
Northwestern Pacific		2						1																					
Oregon Short Line	1		1					1																				1	
Oregon-Wash. R. R. & Navigation Co.		3									1			1	1				1		1			1					
Pacific Electric Railway																2													
Pennsylvania								1					2			6						2		1				1	
Peoria & Eastern		1									1																		
Pere Marquette			1													1		3										2	
Pittsburgh & Lake Erie		1			1										1								1						
Pittsburgh & Shawmut																													
Quebec Central																						1							
Reading						1										4		1										1	
Richmond, Fredericksburg & Potomac		1														2													
Rutland																													
St. Louis-San Francisco	1		1	1				1									1			1	1								1
St. Louis Southwestern	2			1	2	1										3							1						
Seaboard Air Line																													
Southern Pacific		4	3	1		1		4			4		1									2	1	1		1			1
Southern Railway		6			1	2	1	4			2					2		2	1	1		1	1						1
Spokane, Portland & Seattle																1					1								
Terminal R.R. Assoc. of St. Louis		1	1		1											1	1												
Texas & Pacific		4		1	1	3			1		1					9	2		1	1			2	1					1
Union Pacific		3			1	1		1		2	1				1	10		2				1		1	1			1	1
Union Railroad		1																											
Wabash	1					4										2						1						2	
Western Pacific		1				1	1						1							1		2							
Wheeling & Lake Erie																													
TOTAL	28	115	38	11	31	63	12	42	6	8	46	5	24	13	27	10	224	29	34	27	35	4	50	18	21	2	3	10	42	16

Purchaser	Flue Shop Machy		Boiler Shop Machy.				Furnaces		Wood Working Machinery								Hoists			Trucks						
	Flue Welders	Miscl.	Flangers	Forming Rolls	Riveters	Blowers	Oil	Electric and others	Boring Machines	Mortisers	Surfacers and Jointers	Tenoners	Wood Cutting Saws	Others	Overhead Cranes	Car and Loco. Hoists and Drop Tables	Air	Electric	Chain	Electric	Gas	Trailers	Air Brake Test Racks	Air Compressors	Motor	Electric Welders
Akron, Canton & Youngstown																			1							
Ann Arbor																										
Atchison, Topeka & Santa Fe		1				9				1			2	2	1	7		1	2	6	15	51	1	2	40	6
Atlantic Coast Line													1	2												
Baltimore & Ohio							No Report Received																			
Bangor & Aroostook														1												
Belt Railway Company of Chicago																										
Boston & Albany							1	1				1	2													
Bessemer & Lake Erie																										
Boston & Maine		1		1				3						1	1	6		6		14	11					4
Canadian Pacific		1							2	1			1	2		4										
Charleston & Western Carolina																								1		
Central of New Jersey						15	4	3							1	12	24	2	2	2						2
Chesapeake & Ohio							1	1							1				24	1	3					
Chicago, Burlington & Quincy	1																	5		4						1
Chicago & Illinois Midland						1	4	1			1			1			2							2		1
Chicago Great Western																2					1	12				4
Chicago, Indianapolis & Louisville																	1									1
Chicago & North Western						4	4	2	2					1			7	9		14	2		1	3	6	2
Chicago, Milwaukee, St. Paul & Pacific	1	2							2	1	1		2	5												2
Chicago River & Indiana																										
Chicago, Rock Island & Pacific			1		3											1				4	2			1		
Chicago, St. Paul, Minneapolis & Omaha		1	1				8																			3
Colorado & Southern																										
Cley., Cin., Chicago & St. Louis						5								1				1					1			2
Delaware & Hudson															2		3	1		1				2		
Delaware, Lackawanna & Western	1				1											1				1			1		19	2
Denver & Rio Grande Western	1																									
Dominion Atlantic																										
Donora Southern																										
Elgin, Joliet & Eastern								2							2											
Erie			1												1	1		1			2		2	3		
Ft. Worth & Denver City																				1						2
Escanaba & Lake Superior																										
Great Northern					1	3					1		2					1			1					3
Gulf, Mobile & Northern																1										
Gulf Coast Lines										1	2	2	2			4										
Hocking Valley																										
Illinois Central									2								1			2						
International-Great Northern				1															2							
Lake Superior & Ishpeming																										
Lehigh Valley																	1									1
Lehigh & New England																										
Los Angeles & Salt Lake	1							1																2		1
Louisville & Nashville																1				1	2					2
Maine Central							1									4				3						
Michigan Central			1				1		1	2			3	1				1						2		2
Minneapolis & St. Louis						1																				
Minn., St. Paul & Sault Ste. Marie																								1		
Missouri-Kansas-Texas	1			1									2	1			1						5	10		
Missouri Pacific		1	2	1		6			1		1	1	2		1	4				2	12			2	20	6
Monongahela																										
Nashville, Chattanooga & St. Louis							1	1																		1
New Jersey, Indiana & Illinois																								1		
New York Central	2		1	1		9	5	2	1	1	6	1	4	2			11	4			2		1		7	4
New York, Chicago & St. Louis																										2
New York, New Haven & Hartford							1						2	1	3		13		1	16	1	3		2		1
New York, Westchester & Boston																										1
Norfolk Southern																										3
Norfolk & Western		1					1	1					1	2	3	8		6		8		10				
Northern Pacific							5					1	1							3	1					4
Northwestern Pacific															1											
Oregon Short Line							1																			1
Oregon-Wash. R.R. & Navigation Co.																										
Pacific Electric Railway																								1		
Pennsylvania					1		1	6						1	6	3		1	10	3	8	307	9	4		
Peoria & Eastern																										
Pere Marquette		2								1	1		1	2				1					2			
Pittsburgh & Lake Erie					1			1										2								
Pittsburgh & Shawmut								1						1												
Quebec Central																										1
Reading															4			2			1	12				
Richmond, Fredericksburg & Potomac																								1		
Rutland																										1
St. Louis-San Francisco																				1						
St. Louis Southwestern							1							2						1			1			1
Seaboard Air Line																							1			
Southern Pacific				1											4		2									1
Southern Railway			2	1																				1		2
Spokane, Portland & Seattle																							1			
Terminal R.R. Assoc. of St. Louis							1									2				1	1			1		
Texas & Pacific	1	4					5	8		1			1	1	8									3	5	1
Union Pacific							1	8			1	1	4	2			4			1				7	2	
Union Railroad				1												1	1									
Wabash				1			17				4						1						4		2	
Western Pacific																	1									
Wheeling & Lake Erie								1																		1
TOTAL	9	14	9	9	7	53	64	43	11	9	18	7	33	32	39	60	75	44	42	90	65	395	30	52	101	72



Power Hammers Were Ordered in Increased Numbers Last Year

104, 121, 77 and 60. The orders for boring mills have increased six per cent over the orders for 1927. Half of this increase has been in the horizontal boring, milling and drilling machines. That grinding machines have been purchased in large numbers may be attested by the fact that during the five-year period beginning with 1924, the total orders for each year are 240, 291, 408, 288 and 274, respectively. The column headed "Other grinding machines," includes such small machines as double-end, twist drill, tool, universal and chaser grinders, as well as such types as saw-blade, valve, knife, bench and electric car-wheel grinders. The orders placed for cylindrical grinders increased 18 per cent.

Bolt and pipe cutters and threaders have been ordered at the rate of 96, 93, 120, 75 and 62 for each year beginning with 1924 up to and including 1928. The orders for metal cutting saws decreased seven per cent. The total number of orders for presses, hammers, forging machines, punches, shears and combination punches and shears placed during the years 1924 to 1928, were 208, 217, 325, 149 and 166, or an increase for 1928 of 11 per cent over 1927. The principal increase was in the hammer group.

The railroads are continuing to purchase woodworking machines in considerable numbers. During the past five years, beginning with 1924, the roads ordered 146, 160, 216, 124 and 110 units of this class of machinery, which includes borers, mortisers, surfacers, tenoners and saws.

Material Handling Equipment

The amount of material handling equipment purchased, such as cranes, hoists and trucks, remained practically constant during 1925, 1926 and 1927, whereas during 1928, the orders placed for the same equipment has increased considerably. In spite of the general decline in the amount of machine tools and shop equipment ordered during 1927, as compared with 1926, the number of units of the above class of equipment remained constant as compared with the orders placed during previous years.

These facts are significant; they indicate that the railroads are taking full advantage of the economies that can be effected by the utilization of modern equipment of this type. The total number of air, electric and chain hoists ordered during 1925, 1926, 1927 and 1928, were 230, 211, 193 and 161, respectively, and overhead cranes and car and locomotive hoists and drop tables were ordered to the extent of 37 during 1925, 74 during 1926, 95 during 1927, and 99 during 1928. The latter figures show a steady increase in the number of units of this equipment ordered since 1925. The number of electric and gasoline trucks, together with trailers, which were ordered during the past four years, starting with 1925, totaled 216, 309, 220 and 550, respectively. The percentage of increase of electric trucks, gas trucks and trailers for 1928, over 1927, are 75, 97 and 199, respectively.

The orders for riveters and blowers for the past year increased slightly as did the orders for furnaces, which increased 29 per cent over the number ordered during 1928. The column head "Other Furnaces," includes plate and electric rivet furnaces, as well as such equipment as tempering, brass, gas, hammer and forging furnaces.

The railroads ordered 30 air brake test racks during 1928. Fifty-two air compressors of various types were also ordered for shop use.

Shop Equipment Not Listed

Because of space limitations, it is impossible to list all of the equipment reported by the railroads. Some of the equipment reported indicates a marked increase in the adoption of certain modern methods of repairing cars and locomotives. Many of the railroads have been experimenting for some time with the mechanical method of applying paint for the reason that it was felt that decided economies could be effected by the utilization of this method over that of the hand method. During the past year the railroads have ordered 21 units of paint spraying equipment, together with other necessary supplementary equipment for this work. The fact that the railroads have ordered ten locomotive and car cleaning machines indicates that the railroads are endeavoring to eliminte the hand-method of cleaning this equipment.

A Flexible Material-Handling Facility

The railroads reporting have also ordered during the past year 15 locomotive tire heaters, five locomotive firing-up units and nine turntable tractors. It is also of interest to note that three railroads ordered car journal broaching machines during 1928. No orders for such equipment have been reported in previous years.

Signaling Construction Continues In Average Volume During 1928

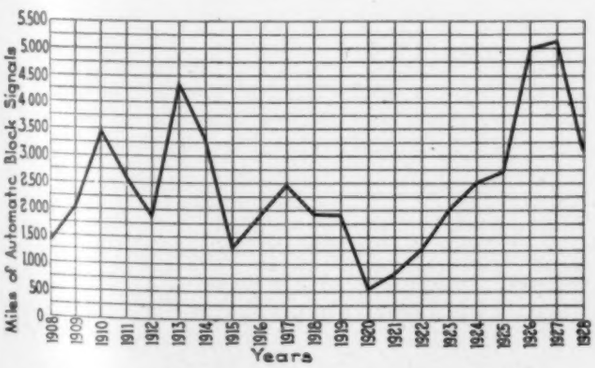
Interest in centralized control and remote power switches—Good prospects for 1929—Train control on new basis

By John H. Dunn
Signaling Editor, *Railway Age*

Above—Color-light automatic signals were installed on 65 miles of double track on the Grand Trunk. Left—A remotely controlled power-operated switch at a passing track on the Texas & Pacific

AUTOMATIC block signals were completed on 3,121 miles of road during 1928, which record exceeds the annual average for the past 10 years by 752 miles, but is considerably less than the 5,127 miles of road equipped in 1927, which was the peak year. The construction of interlocking plants has been carried on actively during 1928, there being 126 new plants completed as compared with 142 during 1927, however the number of levers of interlocking installed totals 2,314, an increase of 278 over the number of levers installed in 1926.

The reduction in the volume of signaling for 1928 is the result of several controlling circumstances, principal of which has been the hesitancy of the railroads to proceed with signaling programs while action was pending before the part of the Interstate Commerce Commission on the adequacy of existing train control and signaling installations, which case was opened by a questionnaire sent to the carriers in August, 1927. Hearings were held before the commission in February and April, 1928, but the report, which included the statement that no orders requiring train control or signals would be issued at this time, was not issued until November 26. The signaling construction activities during 1928 were, therefore, devoted primarily to projects required to handle immediate traffic.



Automatic Signal Construction Activities Since 1908

Table Showing Miles of Road Equipped with Automatic Signal Each Year for the Last 21 Years

Year	Miles of Road Construction of Automatic Block
1908	1,387.6
1909	2,047.1
1910	3,473.8
1911	2,623.4
1912	1,883.9
1913	4,350.5
1914	3,294.2
*1915	1,296.0
*1916	1,891.0
*1917	2,482.0
*1918	1,934.0
*1919	1,923.0
*1920	546.0
*1921	830.0
*1922	1,254.0
*1923	2,019.0
*1924	2,515.0
*1925	2,726.0
*1926	4,992.0
*1927	5,127.0
*1928	3,121.2

* Figures since 1915 are ours, and prior thereto figures are from I. C. C. reports.

Increased attention has been given, during the year to the application of signals and power switches, whereby train stops are eliminated and movements are directed

by signal indication without written train orders. During 1928, the Pere Marquette completed an installation of the centralized control system on 20 miles of single track, and the Boston & Maine undertook a similar installation on 13 miles of double track, on which train movements are to be directed in either direction on each of the two tracks. A similar installation is under construction on 20.7 miles of double and 9.2 miles of single track on the Texas & Pacific between Dallas, Tex., and Ft. Worth, as well as on 51.2 miles of double and 30.0 miles of single track between Addis, La., and mile post 9.5. The Canadian Pacific and the Denver & Rio Grande Western likewise have installations of centralized control under way or completed.

Table A—Automatic Block Signals Completed During 1928

Road	Location	Miles of Road	Number of Signals	Manufacturer
A. T. & S. F.	Richmond, Kan. to Iola	36.0s	59s	Union
	Newton, Kan. to Wichita	26.0s	35s 2c	Union
	Mulvane, Kan. to Winfield	23.0s	28s	Union
	Newkirk, Okla. to Cross	8.0s	11s	Union
	Dewey, Okla. to Bartlesville	4.0s	5s	Union
	Mulvane, Kan. to Cicero	11.0s	13s	Union
	Ft. Sumner, N. M. to Ricardo	13.5s	26s	Union
	Buchanon, N. M. to Mountainair	99.6s	183s	Union
	Glorieta, N. M. to Lamy	9.8s	22s	Union
	Jansen, Colo. to Gallings	8.0d	17s	Union
	Rowe, N. M. to Fox	4.4s	4s	Union
	Saginaw, Tex. to Gainesville	56.8s	104s	Union
	Belen, N. M. to Dalies	10.3s	12c	Union
	Chambers, Ariz. to Carrizo	32.5s	40c	Union
	Corona, Cal. to Riverside	14.3s	36c	Union
	Attica, Kan. to Waynoka	59.9½	109s	Union
	Gage, Okla. to Canadian, Tex.	48.4s	80s	Union
A. C. L.	Winter Park, Fla. to Orlando	0.6s	15s	Union
	Dunnellon, Fla. to Vitis	6.4d	4s	Union
	Vitis, Fla. to Gary	1.8s	2s	Union
	Vitis, Fla. to Lakeland	0.7s	1s	Union
C. N.	Springhill, N. S.	1.3s	2s	Union
	Belmont, N. B.	1.1s	2s	Union
	Halifax, N. S.		1s	Union
	Rimouski, Que	4.9s	5s	Union
	St. Nicholas, Que	2.5s	2c	Chicago
	St. Hubert, Que.	4.0s	3c	Chicago
	St. Zotique, Que. to Prescott, Ont.	73.0d	5s 94c	Union
	Ingersoll, Ont. to London	19.0d	22c	Union
	St. Fabien, Que.	0.5s	1s	G.R.S.
	Lac St. Anne, Alta. to M. P. 63		1s	Union
G. T. W.	Granger, Ind. to Battle Creek, Mich.	65.0d	73c	Union
	Lansing, Mich.	4.0s	3c	Union
	Ionia, Mich.	1.6s	2c	Union
	Pontiac, Mich.	2.2s	4c	Union
	Corunna, Mich.	1.6s	2c	Union
C. P.	Medicine Hat, B. C. to Dunmore	9.0s	18s	G.R.S.
	Grenfell, Sask. to Indian Head	37.0s	115s	Union
	Golden, B. C. to Beaver Mouth	20.0s		
	St. Luc, Que. to Outremont	4.0d	10c	Union
	Short installations at 16 stations	5.5s 22.5d	16s 22c	
C. N. J.	Woodbridge, Jct., N. J. to Raritan River	1.6f	8c	Union
	Raritan River, N. J. to Branchport	21.3d	63c	Union
C. & O.	Ft. Springs, W. Va.		2s	Union
	St. Albans, W. Va.		1s	Union
	Cheriot, Ohio	4.0s	4c	Union
	Newport, Ky. to Cincinnati, Ohio	1.0f 2.0d		
C. & A.	Joliet, Ill. to So. Joliet	1.3s 4.0d		G.R.S.
C. B. & Q.	Pacific Jct. Ia. to Council Bluffs	17.5s	41c	G.R.S.
	Alma, Wis. to Stockholm	21.0d	49c	G.R.S.
	Hager, Wis. to Hastings	20.0d	32c	G.R.S.
	Harrington, Wis. to Sullivan	6.5s	23s	G.R.S.
C. R. I. & P.	Various places		7s 6c	Union
C. S. S. & S. B.	Gary, Ind. to Calumet	6.0d	12c	Union
	State Line, Ind. to Parsons, Ill.	6.0d	16c	Union
	Keiser, Ind. to Sheridan	5.0s	11c	Union
C. & W. I.	Chicago		3s	G.R.S.
C. & S.	Walsenburg, Colo. to Trinidad	40.9s	82c	G.R.S.
D. & R. G. W.	Canon City, Colo. to Minturn	122.3s 18.7d	210c	G.R.S
	Maxwell, Utah to Sol Summit	4.2s	67c	G.R.S.
E. J. & E.	Ivanhoe, Ind.	2.7d	5s	G.R.S.
G. N.	Sandstone, Minn. to Brook Park	18.1s	32s	G.R.S.
	Appleyard, Wash. to Peshastin	21.5s	48c	G.R.S.
	Peshastin, Wash. to Winton	19.3s	31c	G.R.S.
H. V.	Columbus, Ohio to Valley Crossing	9.0d	19c	Union
I. C.	Salina, Ill. to Reeseville	13.2s 1.0d	19c	Union
L. H. & St. L.	Strawberry, Ky. to Stephensport	60.0s	115s	Union
L. & N.	Page, Ky.	1.0s	2s	Union
	Avoca, Ky. to Lexington	88.0s	141s	Union
M.St.P.& S.S.M.	Schiller Park, Ill.	3.0s	9c	G.R.S.
M. K. T.	Ney, Tex. to Alvarado	28.5s	33c	Union
M. P.	Clear Lake Jct., Ark. to Texarkana	10.3d	17c	G.R.S.
	Bald Knob, Ark. to Wynne	45.0s	73c	G.R.S.
	Bald Knob, Ark. to Little Rock	56.9d	113c	G.R.S.
	Benton, Ark. to Hot Springs	33.0s	44c	G.R.S.
	Dupo, Ill. to Columbia	2.9d	5c	G.R.S.
	Isbell, Mo. to Osage	8.0d	11c	H.B.
	Herman, Mo. to Gasconade	11.8d	10c	H.B.
	Labadie, Mo. to Washington	9.4d	12c	Chicago
	Cornell, Kan. to Pittsburgh	6.0s		
N. Y. C.	Mt. Vernon, N. Y. to White Plains	12.1d	28c	G.R.S.
	Englewood, N. J. to Dumont	4.0f	16c	G.R.S.
	Iona Island, N. Y. to Newburgh	15.0d	30c	G.R.S.
	Rochester, N. Y. to Lockport	53.0d	104c	G.R.S.
C.C.C. & St. L.	Kenton, Ohio to Bellefontaine	23.5d	38c	Union
	Cincinnati, Ohio to Greensburg, Ind.	59.5d	110c	Union
	Dix, Ind. to Beech Grove, Ind.	8.1d	16c	Union
	Dow, Ind. to So. Anderson	2.8s 1.4d	9s	Union Union
M. C.	Orion, Mich.	1.7s	2c	G.R.S.
	Niagara Falls, Ont. to Fraser	5.0d	14c	G.R.S.
N. C. & St. L.	Bridgeport, Ala. to Chattanooga, Tenn.	27.9d	6s 46c	Union
N. Y. N. H. & H.	Saybrook, Conn. to Soundview	4.6d	9c	Union
	Waterford, Conn. to New London	4.0d	19c	Union
	Groton, Conn. to Midway	3.3f	6s	G.R.S.
	Midway, Conn. to Mystic	4.3d	8s	G.R.S.
	Hillsgrove, R. I. to Auburn	5.7d	5c	Union
N. Y. O & W.	Poyntelle, Pa. to Mayfield	23.0s	18c	Union
N. & W.	Winston, N. C. to Winston-Salem	2.5d	8p	Union
P. E.	Walker, Cal.	0.2s	4c	Union
	Los Nogales, Cal. to Rio Vista	0.5s	4c	Union
	Rivas, Cal. to Glendora	3.9s	11c	Union
	Hermosillo, Cal. to El Nido	2.6s	12c	Union
	Vineyard, Cal. to Sherman Jct.	3.4d	16c	Union
Penn.	W. Philadelphia, Pa. to West Yard, Del.	27.5f	99p	Union
	W. Philadelphia, Pa. to Elwyn	13.2d	30p	Union
	Colonia, N. J. to Millham Jct.	33.0f	140p	Union
	Rochester, Pa. to Yellow Creek, Ohio	25.5d	39s	Union
	Summitville, Ohio to Bayard	8.8d	11s	Union
	Yellow Creek, Ohio to Summitville	20.1s	14s	Union
	Edenburg, Pa. to Struthers	9.3d	10s 4p	Union
	Hinsdale, N. Y. to Olean	6.8d	6s 3p	Union
	So. Chicago, Ill. to Whiting, Ind.	4.9s	5p	Union
	Roby, Ind. to Whiting	1.4s	1p	Union
	Colson, Ohio to Bucyrus	1.9d	5p	Union
	Hamlet, Ind. to Hays Siding	2.1d	4p	Union
	No. Judson, Ind. to Bernice, Ill.	50.9d	59s	Union
	Columbus, Ohio to Xenia	51.5d	46s 9p	Union
	Columbus, Ohio	2.5d	5p	Union
	Knightsville, Ind. to Macksville	22.3d	62p	Union
P. M.	* Flint, Mich. to Saginaw	20.0s 10.0d	55c	Union
Reading	Nicetown, Pa. to Nicetown	3.4d 1.6t	25c	Union
	Shippensburg, Pa. to Lurgan	2.4d	8c	Union
	Newton, Pa. to Neshaming	9.5d	31c	Union
St. L.-S. F.	Harvard, Ark. to Critco	4.9d	9s	Union
	Thayer, Mo. to Hoxie, Ark.	58.0s	93s	Union
	Springfield, Mo. to Nichols	3.7s	5s	Union
S. P.	Davis, Cal. to Woodland	10.0s	17c	Union
	Woodland, Cal. to Tehama	100.7s	146c	Union
	Berg, Cal. to Tehama	25.0s	50s	Union
	Clawson, Ore. to Ashland	2.5s	7s 2c	Union
	Picacho, Ariz. to Stockham	40.0s	97s	Union
	Polvo, Ariz. to Vail	13.4s	8s	Union
Tex. & Lou.	Corsicana, Tex. to Miller	43.7s	111s	Union
	Flatonia, Tex. to Giddings	59.0s	87s	Union
T. & P.	Addis, La. to Livonia	24.1s	51c	G.R.S.
	Longview, Tex. to Dallas	121.0s	207c	G.R.S.
	Alexandria, La.	3.4d	16c	G.R.S.
	Ft. Worth, Tex. to Lancaster	2.3d	8c	G.R.S.
	Shreveport, La.		1c	G.R.S.
	Ft. Worth, Tex. to Baird	133.4s	240c	G.R.S.
	Baird, Tex. to Toyah	280.6s	431c	G.R.S.
U. P.	Ft. Hall, Idaho to Idaho Falls	37.1s	100c	Union
	Ticeska, Idaho to King Hill	9.8s	18s	Union
	Kimama, Idaho to Dietrich	10.6s	13s	Union
Wabash	Edwardsville, Ill. to Granite City	14.0d	20c	Union
	St. Louis, Mo.		1c	Union
	Litchfield, Ill. to Mt. Olive	6.2d	8s	Union
	Decatur, Ill. to Knights	3.6d	9c	Union
	Totals	2,155.8s 893.4d 70.4f 1.6t	1,935s 3,226c 375p	
		3,121.2	5,536	

Legend—
In "Miles of Road" column: s = Single track. d = Double track. t = Three tracks. f = Four tracks.
In "No. of Signals" column: s = Semaphore. c = Color-light. p = Position-light.
* = Installed in connection with centralized control system.

The simplified circuits developed for centralized control practically eliminate any limitation being placed on the distance from which a power switch may be controlled, two or three wires being adequate to control the operation of the switch and the signals, to direct train movements to the different routes. The system is, therefore, readily adaptable to the control of remote power switches at the ends of double track and of passing tracks on grades where it is desirable to eliminate train stops. During the last year the Chicago, Burlington & Quincy has employed such a system of control for two switches at the ends of double track near Concord, Ill., and the Texas & Pacific is controlling the operation of passing track switches at Dome, Tex. The C. C. C. & St. L. is using these simplified circuits to control five manual block signals at passing tracks, the control of the signal, the indication of the position of the signal and the automatic "O.S."ing of the passing of the trains all being accomplished over two wires. The services of operators at these stations are, therefore, no longer required.

The same circuit system is being used for the remote control of complete small interlocking plants previously requiring levermen for operation, the new control now

Table B—Automatic Block Signals Under Construction, December 31, 1928

Road	Location	Miles of Road	Number of Signals	Manufacturer
A. T. & S. F.	Hobart, Cal. to Fullerton	19.3s	41c	Union
B. & O.	Grafton, W. Va. to Parkersburgh	90.0s	210cp	Union
		13.2d		
	Newark, Ohio to Columbus	35.2d	85p	Union
	Akron Jct., Ohio to Warwick	15.6d	35cp	Union
B. & M.	*Chelmsford, Mass. to Ayers	13.0d	44c	G.R.S.
	*Hoosac Tunnel, Mass. to N. Adams	6.0d	24c	Union
C. N.	Riv. du Loup, Que.	1.7s	2s	
C. & N. W.	Gladstone Park, Ill. to Deval.	8.0s	21c	G.R.S.
G. N.	St. Cloud, Minn. to Moorhead	165.2s	284c	Chicago
	Berne, Wash. to Scenic	12.0s	18c	G.R.S.
M. P. I. G. N.	Palestine, Tex. to Longview	81.3s		G.R.S.
G. C. L.	De Quincy, La. to Kinder	35.0s		G.R.S.
N. Y. C.	Garrison, N. Y. to Beacon	10.2f	40c	G.R.S.
		10.4s	24c	G.R.S.
N. Y. N. H. & H.	Devon, Conn. to Derby Jct.	8.5d	9c	Union
N. Y. O. & W.	Fulton, N. Y.	4.0s	11c	Union
P. E.	Riverglen, Cal. to Glenhurst	0.3d	1c	Union
	Valley Jct., Cal. to Ramona	4.1d	17c	Union
	Indian Village, Cal. to Sierra Park	6.5f	78c	Union
Penna.	Akron Jct., Ohio to Warwick	16.0d	26c	Union
	Girard Jct., Pa. to Thornton Jct.	1.7d	4s	Union
	Upper Sandusky, Ohio		5p	Union
	Plymouth, Ind.		1p	Union
	Donaldson, Ind.		2p	Union
	Xenia, Ohio to Clare	37.6s		Union
		18.6d		
	Xenia, Ohio to Dayton	15.4s		Union
	Miami City Jct., Ohio to New Paris	24.0s		Union
Reading	Jenkintown, Pa. to Yardley	10.9d	67c	Union
		0.7t		
		9.4f		
S. P.	Ashland, Ore. to Roseburg	43.3s	51s	Union
	Gazelle, Cal. to Montague	11.0s	13s	Union
	Exeter, Cal. to Famosa	43.0s	106c	Union
	Brawley, Cal. to Calexico	19.0s	34s	Union
			5c	
	Ming, Ariz. to Picacho	94.0s	152s	Union
	El Paso, Tex. to Carrizozo	32.0s	78s	Union
			13c	
	Winkle, N. M. to Guadalupe	13.0s	22s	Union
St. L.-S. F.	Tulsa, Okla. to Sapulpa	13.0d	27s	Union
	Sapulpa, Okla. to Bristow	23.0s	39s	Union
	Bridge Jct., Ark.	1.6s	5s	Union
T. & P.	*Dallas, Tex. to M. P. 224	9.2s	20c	G.R.S.
	*Ft. Worth, Tex. to M. P. 224	20.7d	50c	G.R.S.
	*Addis, La. to Johnson	51.2d	90c	G.R.S.
	*Johnson, La. to M. P. 9.5	30.0s	43c	G.R.S.
U. P.	Limon, Colo. to Denver	89.0s	161c	Union
Wab.	Allentown, Mo. to Labadie	11.9d		
	Totals	912.0s	1193c	
		239.9d	245cp	
		26.1f	93p	
		0.7t	427s	
		1,178.7	1,958	

Legend—
In "Miles of Road" column: s = Single track. d = Double track. t = Three tracks. f = Four tracks.
In "No. of Signals" column: s = Semaphore. c = Color-light. p = Position-light. cp = Color-position-light.
* Installed in connection with centralized control.

Table C—Automatic Block Signals Contemplated for 1929

Road	Location	Miles of Road	Number of Signals	Manufacturer
A. T. & S. F.	Ottawa Jct., Kan. to Richmond	16.0s	25s	Union
	Iola, Kan. to Chanute	16.0s	26s	Union
	White Eagle, Okla. to E. O. Jct.	54.0s	87s	Union
	Nicholls, Tex. to Revision	31.0s	51s	Union
	Goldthwaite, Tex. to Mullen	11.0s	16s	Union
	Baggett, Tex.		1s	Union
	Crawford, Tex.		1s	Union
	Valley Mills, Tex.		1s	Union
	Meridian, Tex.		1s	Union
	Heidenheimer, Tex.		1s	Union
	Fairplains, Tex.		1s	Union
	Valley View, Tex.		2s	Union
	Sanger, Tex.		2s	Union
	Krum, Tex.		2s	Union
	Ponder, Tex.		2s	Union
	Justin, Tex.		2s	Union
	Haslet, Tex.		2s	Union
	Berwyn, Okla.		2s	Union
	Davidson, Tex.		2s	Union
	Wellington, Kan. to Attica	47.3s		Union
	Tangiers, Okla. to Gage	14.1s		Union
	Clovis, N. M. to Ft. Sumner	60.1s		Union
	Ricardo, N. M. to Buchanon	25.8s		Union
	Burrton, Kan. to Hutchinson	12.4d		Union
	Sears, Kan. to Syracuse	96.4s		Union
	Syracuse, Kan. to Morse, Colo.	42.8s		Union
	Morse, Colo. to Casa	53.7s		Union
	Pueblo, Colo. to Bragdon	11.5s		Union
	Gallings, Colo. to Raton, N.M.	12.9d		Union
	Kepperl, Tex.		1s	Union
	Rogers, Tex.		1s	Union
	Carrizo, Ariz. to Winslow	47.5d	50c	Union
	Riverside, Cal. to Colton	6.9d	12c	Union
	Atwood, Cal. to Fullerton	5.4s	11c	Union
	Oceanside, Cal. to San Diego	41.2s	85c	Union
B. & O.	Viaduct Jct., Md. to Blaser, W. Va.	80.1d		
	West End, W. Va., to E. Grafton	15.7d		
	Patterson Creek, W. Va. to McKenzie	6.3d		
	No. Lima, Ohio to Penn Jct	67.7s		
	Sbattinc, Ill. to E. St. Louis	50.0s		
		4.5d		
C. N.	Sackville, N. B.	0.5s	1c	
	Charlottetown, P. E. I.	1.0s	3c	
	St. Fabien, Quec.	1.5s	3c	
C. M. St. P. & P.	Rondout, Ill. to Fox Lake	17.0s		
C. I. & L.	Salem, Ind. to Pekin	12.0s	30s	
E. J. & E.	Barrington, Ill.	1.0s	2s	
	Spaulding, Ill.	1.0s	2s	
Erie	Meadville, Pa. to Salamanca, N. Y.	19.5s	218c	
		89.5d		
G. N.	Brookston, Minn. to Kelly Lake	50.3s		
	Swan River, Minn. to Gunn	16.5s		
	Williston, N. D. to Snowden, Mont.	25.9s		
H. V.	Columbus, Ohio to Morral	54.0d	90c	
M. P.	Edgewater Jct., Kan. to No. Kan. Jct.	45.1s		
	Alexandria, La. to Urania	45.9s		
	Osawatomie, Kan. to Coffeyville	134.5s		
	Roots, Ill. to Raddle	26.7s		
	Valley Jct. Ill. to M. & O. Xing	9.3d		
I. G. N.	Austin, Tex. to San Marcos	30.0s		
	Percival, Tex. to Spring	19.0s		
G. C. L.	Gulf Coast, Tex. to Fullerton	33.0s		
	Fullerton, Tex. to Beaumont	50.0s		
N. Y. C. I. H. B.	Calumet Park, Ill. to Blue Island	8.1d	35c	
	McCook, Ill. to Franklin Park	10.5d	18c	
N. Y. C. & St. L.	Arcadia, Ohio to Edgerton, Ind.	68.0s	115c	
N. Y. N. H. & H.	Boston, Mass. to Chickering	1.4f	18s	G.R.S.
P. E.	Hollywood, Cal. to Van Nuys	7.0s	17c	
	Hooper, Cal. to Wutts	6.5f	78c	
	Hermosillo, Cal. to Torrance	3.2s	12c	
S. P.	Roseville, Cal. to Tehama	68.7s	85c	Union
	Redwood, Cal. to Centerville	5.5s	13s	Union
	Niland, Cal. to Brawley	14.5s	28s	Union
	Estrella, Ariz. to Picatho	22.0s	41s	Union
	Mongola, N. M. to Strauss	81.0s	142s	Union
	Pratt, N. M. to Mastodan	32.0s	61s	Union
T. & L. Lines.	Hearne, Tex. to Giddings	59.1s	98s	Union
	Garrett, Tex. to Ft. Worth	52.7s	92s	Union
	Beeville, Tex. to Skidmore	11.5s	23s	Union
	Houston, Tex.	2.5s	13s	Union
St. L.-S. F.	Bristow, Okla. to Oklahoma City	80.0s	138s	Union
U. P.	Ellis, Kan. to Limon, Colo.	246.0s	425c	Union
O. SL.	Hawley, Idaho to Max	8.1d	17s	Union
	Extensions		32s	Union
Wabash	Chicago to Orland, Ill.	12.4d	28c	Union
	Lodge, Ill. to Bement	13.0d	25c	Union
	Peru, Ill. to Huntington	32.1s	30c	Union
	Totals	1,960.2s	979s	
		391.2d	1,341c	
		7.9t		
		2,359.3	2,320	

Legend—
In "Miles of Road" column: s = Single track. d = Double track. t = Three tracks. f = Four tracks.
In "No. of Signals" column: s = Semaphore. c = Color-light.

being placed in an existing tower at another plant. Such an installation is now under construction on the Burlington at Lincoln, Neb. Similar systems to accomplish the same purpose of controlling the operation of outlying switches, and to direct the movement of trains in these areas by signal indication have been installed during 1928 at 83 points, using 312 desk levers and 136 power switch machines.

Automatic Block Signals Completed in 1928

Of the 3,121 miles of road equipped with automatic block signals in 1928, over 2,156 miles was on single track, 893.4 miles on double, 70.4 miles on three-track, and 1.6 miles on four-track lines. The Texas & Pacific equipped 568 miles of single track with signals, while the Santa Fe was next in mileage with 465.5 miles and the Denver & Rio Grande Western equipped 145.2 miles. The Southern Pacific is in the midst of an extensive signaling program, 191.6 miles of single track being equipped on the Pacific system and 102.7 miles on the lines in Texas and Louisiana during 1928.

The double-track mileage equipped with automatic signals in 1928 (893.4 miles), represented a number of short installations. The Grand Trunk Western provided signals on 65 miles of double track from Granger, Ind., to Battle Creek, Mich., and the next longest installation was 59 miles on the Cleveland, Cincinnati, Chicago & St. Louis from Cincinnati, Ohio, to Greensburg, Ind., while the Missouri Pacific equipped 56 miles from Bald Knob, Ark., to Little Rock.

The preference for light signals is indicated by the fact that the total of 5,536 automatic signals installed last year, 1,935 were semaphore signals and 3,601 light signals. Of the light signals used, 3,226 were color-light and 375 position light.

Alternating current signal equipment was used on 13.2 miles of single, 93.2 miles of double, and 62.5 miles of four-track lines, including 39 semaphore and 398 light signals.

Where light signals are employed, increased preference is shown for the use of alternating current from a supply line for the operation of the signals, in which case storage batteries or primary batteries are installed for line and track circuits and for emergency operation of the signals in case of a power failure. During 1928, the a-c. floating method, using storage batteries charged by alternating current through rectifiers, was extended to 1,308.6 miles of single and 802.2 miles of double-track signaling, including 527 semaphore and 2,984 light signals. Of this total, primary battery was used for track circuits only at least 100 miles of road. The a-c. primary system, using a-c. power for normal signal operation and primary batteries for line and track circuits, was used on 27.9 miles of double track. Especially for semaphore signals and, in some cases, for light signals, where commercial a-c. power is not available, primary battery was installed for signal operation as well as the line and track circuits during 1928 on 568.1 miles of single and 19.3 miles of double track, including 1,018 semaphore and 67 light signals.

Table D—Interlocking Plants Completed During 1928

Road	Location	Manufacturer	Working Levers: Mechanical	Electrical	Electro-Pneumatic	Elec. Mech.: Mech.	Elec. Mech.: Elec.
A. T. & S. F.	Pueblo, Colo.	....	..	8	..	..	..
	Texico, N. M.	....	..	10	..	..	..
	Lubbock, Tex.	....	..	6	..	..	..
	Plainview, Tex.	....	..	4	..	..	..
	Waynoka, Okla.	....	..	14	..	..	..
	Marietta, Okla.	Union	..	8	..	..	..
	N. Ft. Worth, Tex.	G.R.S.	..	4	..	..	..
	Beaumont, Tex.	Union	..	8	..	..	..
A. C. L.	Orlando, Fla.	Union	..	..	..	7	3
	Gary, Fla.	Union	..	..	..	12	5
	Carbur, Fla.	Union	6	..	..	..	..
	St. Petersburg, Fla.	Union	..	..	..	5	..
	Thomasville, Ga.	Union	..	..	..	11	6
B. & M.	Ayer, Mass.	Union	..	..	37	..	..
	Lowell Jct., Mass.	G.R.S.	..	33	..	..	..
	Dover, N. H.	G.R.S.	..	46	..	..	..
	Biddeford, Me.	Union	..	..	..	13	4
C. N.	Port Colborne, Ont.	Union	16	..	..	..	..
C. N. J.	Woodbridge Jct., N.J.	Union	..	..	23	..	..
C. & O.	Lockbourne, Ohio	....	..	..	..	1	1
	Ona, W. Va.	Union	..	..	..	5	4
	Ranger, W. Va.	....	4	..	..	..	..
	Gill, W. Va.	....	4	..	..	..	..
C. & N. W.	Goldfield, Iowa	....	2	..	..	..	..
	Elkton, S. D.	....	2	..	..	..	..
C. & W. I.	Chicago (81st. street)	....	24	..	..	..	..
C. M. St. P. & P.	Moline, Ill.	....	4	..	..	..	..
C. R. I. & P.	Chicago	Union	..	33	..	..	..
D. L. & W.	L. Hack. Draw., N. J.	Union	..	..	17	..	..
	Denville, N. J.	Union	..	..	33	..	..
	Boonton, N. J.	Union	..	..	17	..	..
I. R. T.	Pelham Yard	Union	..	..	71	..	..
	Corona Yard	Union	..	..	60	..	..
	148th St. Yard	Union	..	..	90	..	..
K. C. S.	Kansas City, Mo.	G.R.S.	..	..	..	1	..
	Belt Junction, Mo.	....	..	..	..	5	..
	Mauriceville, Tex.	....	..	..	..	8	..
L. V.	Musconetcong Tunnel, N. J.	G.R.S.	..	67	..	..	..
L. & N.	Tensas, Ala.	....	..	..	..	4	2
	Chickasaw Bogue, Ala.	....	..	..	..	4	2
	Mobile River, Ala.	....	..	..	..	4	2
M. K. T.	Lancaster, Tex.	Union	4	..	..	..	..
	Parsons, Kan.	Union	6	..	..	..	..
M. P.	Osawatomie, Kan.	....	10	..	..	..	6
G. C. L.	Harlingen, Tex.	Union	22	..	..	..	..
I. G. N.	Bayou Buffalo, Tex.	G.R.S.	..	27	..	..	..
	Pierce Jct., Tex.	G.R.S.	8	..	..	..	..
	McNeil, Tex.	Union	6	..	..	..	..
N. Y. C.	Buffalo (SS-48) N.Y.	G.R.S.	..	308	..	..	..
	Buffalo (SS-49) N.Y.	G.R.S.	..	382	..	..	..
	Rochester, N. Y.	G.R.S.	..	165	..	..	..
	Depew, N. Y.	G.R.S.	..	38	..	..	..
	Dumont, N. J.	G.R.S.	..	..	..	23	19
	Churchville, N. Y.	G.R.S.	..	..	..	..	1
	Jersey Shore, Pa.	G.R.S.	..	..	..	..	4
	Chicago	G.R.S.	..	44	..	..	..
O. C. L.	Stanley, Ohio	G.R.S.	..	130	..	..	..
C. C. C. & St.L.	Sedamsville, Ohio	Union	..	15	..	..	..
	Riverside, Ohio	Union	..	11	..	..	..
	Terre Haute, Ind.	....	..	5	..	..	..
N. Y. N. H. & H.	Springfield, Mass.	Union	..	47	..	..	..
	Conn. River Bridge, Conn.	Union	..	9	..	..	..
	Harlem River, N. Y.	....	20	..	..	..	..
Penna.	Whiting, Ind.	....	..	..	..	16	1
	Hegewisch, Ill.	....	..	2	..	..	..
	Colehour, Ill.	....	..	5	..	..	..
	"Vigo" Terre Haute, Ind.	Union	..	8	..	..	..
	"D S" Terre Haute, Ind	Union	..	9	..	..	..
	"HS" Tower, Columbus, Ohio	....	..	..	..	6	1
	Harmony, Ind.	Union	..	3	..	..	..
Reading	Cape May, N. J.	Union	6	..	..	..	..
St. L.-S. F.	Boligee, Ala.	Union	15	..	..	..	..
S. P. (T. & L.)	McNeil, Tex.	Union	8	..	..	..	..
	Cruse, Tex.	Union	4	..	..	..	..
	Houston, Tex.	G.R.S.	..	27	..	..	..
	Harlingen, Tex.	Union	..	..	..	18	1
	Edinburg, Tex.	Union	8	..	..	..	..
	Edinburg Jct., Tex.	Union	..	..	..	7	1
	Lancaster, Tex.	Union	..	..	..	4	1
T. & P.	Big Sandy, Tex.	G.R.S.	..	22	..	..	..
	Alexandria, La.	G.R.S.	..	..	..	13	..
	Eastland, Tex.	G.R.S.	7	1	..	..	..
U. P. System							
O. S. L.	Dunaway, Ore.	Union	4	..	..	..	..
O. W. R. & N.	Saginaw, Wash.	Union	11	..	..	..	..
U. P. (R. R.)	Abilene, Kan.	Union	6	..	..	..	..
Wabash	Decatur, Ill.	Union	..	4	..	..	..
Totals	New.... Plants 86						
	New.... Levers 2,314		207	1,503	350	169	84
	Rebuilt, not listed in table, Plants 53						
	Rebuilt, not listed in table, Levers 540		117	67	121	76	19

Interesting Features of the Interlocking Plants Constructed in 1928

The interlocking construction for 1928 included 88 new plants, of which 24 were mechanical, 33 electrical,

8 electro-pneumatic and 23 electro-mechanical. A total of 2,314 levers were included in these new plants and at 53 other plants which were rebuilt, a total of 540 levers were added, making a total of 2,854 new levers of interlocking installed during 1928. The 382-lever electric plant installed during the year by the New York Central at Buffalo is said to contain the largest number of levers of any one plant in the world.

Automatic signal protection for railroad grade crossings, termed automatic interlocking, was installed at 40 crossings in 1928, as compared with 31 in 1927. These installations are in lieu of interlockings involving machines which require levermen for operation. The Chicago, Milwaukee, St. Paul & Pacific installed nine of these plants, and the Chicago & North Western and the St. Louis-San Francisco each installed four. The same idea of automatic control is being used for the protection of gauntlet tracks, such as for example on the bridge of the Louisville & Nashville over the Cumberland river.

A total of 158 spring switches were installed during 1928 as compared with 81 in 1927. The Southern Pacific installed 27, the Atchison, Topeka & Santa Fe 16, the Pacific Electric 17, and the Union Pacific 11, the remainder being reported from 22 other carriers. It is evident that the roads are quite rapidly adopting this method of preventing train stops at the ends of double track, at yard leads, and at certain sidings, where train movements predominate in one direction. One of the important problems under discussion at this time is the proper signal protection for various applications of spring switches.

Table E—Interlocking Plants Under Construction December 31, 1928

Road	Location	Manufacturer	Working Levers: Mechanical	Electrical	Electro-Pneumatic	Elec. Mech.: Mech.	Elec. Mech.: Elec.
A. T. & S. F.	Emporia, Kan.	G.R.S.	..	48	..	..	..
	Fullerton, Cal.	G.R.S.	..	x	..	..	..
B. & O.	Various locations (3)	....	..	x	..	..	..
B. & M.	East Portal, Hoosac Tunnel, Mass.	Union	..	..	..	2	4
	West Portal, Hoosac Tunnel, Mass.	Union	..	..	..	2	8
	Hoosac Tunnel, Mass.	Union	..	3	..	..	..
C. & O.	K. C. Junction, Ky.	....	..	..	50	..	..
	Covington, Ky.	....	..	..	18	..	..
L. & N.	Bayou Sara, Ala.	....	..	..	..	4	2
M. P.	Kansas City, Mo.	....	8	..	..	..	..
	St. Louis, Mo.	....	..	57	..	..	..
	Belt Jct., Mo.	....	2	..	..	2	1
G. C. L.	Mauriceville, Tex.	G.R.S.	8	..	..	..	..
	Fayesville, Tex.	Union	6	..	..	..	..
	Fullerton, Tex.	Union	6	..	..	..	..
	Kinder, La.	G.R.S.	..	1	..	..	..
I. G. N.	Tatsie, Tex.	Union	15	..	..	..	..
N. Y. C. (System)							
N. Y. C.	Garrison, N. Y.	G.R.S.	..	..	..	10	17
	W. Bergen, N. Y.	G.R.S.	..	..	..	22	20
C. C. C. & St. L.	Union City, Ind.	Union	..	35	..	..	..
Penna.	Harrisburg, Pa.	Union	..	..	98	..	..
	Lancaster, Pa.	Union	..	..	46	..	..
	Edenburg, Pa.	Union	..	4	..	..	..
	Boanna, Ohio	Union	..	4	..	..	..
	Union City, Ind.	....	..	..	..	..	..
Reading	Pottsville Jct., Pa.	Union	..	..	..	9	9
St. L.-S. F.	Nettleton, Ark.	Union	18	..	..	..	..
S. P. (T. & L.)	Tatsie, Tex.	Union	..	..	..	9	1
	Edcouch, Tex.	Union	..	..	..	7	1
	Lantana, Tex.	Union	..	..	..	7	1
	Rosita, Tex.	Union	8	..	..	..	..
Totals	New: Plants 32 / Levers 573		71	152	212	74	64
	Rebuilt, not listed in table: Plants 24 / Levers 283		67	19	29	79	105

Car Retarders Installed

Car retarders were installed at four yards during 1928, totaling 80 retarders, as compared with six installations in 1927 totaling 135 retarders. The Texas & Pacific, the New York Central and the Lehigh Valley each provided retarders at a yard, and the State Line Generating Company installed retarders on tracks for coal, entering a large power plant near State Line, Ind. Outstanding improvements have been made in retarders during 1928, and several installations are planned or under construction. The Chicago & North Western is providing 27 retarders in its new yard at Proviso, Ill., and the C. C. C. & St. L., has an installation of 24 retarders under construction in the yard at Sharonville, Ohio.

Highway Crossing Protection Increasing

During 1928, the railroads continued an active program to provide automatic highway crossing signals, a total of 2,254 being installed as compared with 2,185 in 1927. Of the 2,254 signals completed last year, 676 were the wig-wag type and 1,578 the flash-light type. Many of these signals were installed at crossings where no protection was provided previously, while at other locations the signals now provide full 24-hour protection, replacing watchmen or manually-operated gates formerly in service only 12 or 16 hours of the day.

Table F—Interlocking Plants Contemplated for 1929

Road	Location	Manufacturer	Working Levers: Mechanical	Electrical	Electro-Pneumatic	Elec. Mech.: Mech.	Elec. Mech.: Elec.
A. T. & S. F.	Augusta, Kan.	G.R.S.	..	63	..	..	..
	Hillmaid, Cal.	....	x	..	..	..	..
	Exeter, Cal.	....	x	..	..	..	..
C. & O.	Limeville, Ky.	....	..	..	..	10	8
C. & A.	Delavan, Ill.	G.R.S.	24	..	..	..	..
Cleveland Union Term.	Cleveland, Ohio	G.R.S.	..	560	..	..	..
Erie	Salamanca, N. Y.	Union	..	..	..	10	7
K. C. S.	Sallisaw, Okla.	....	..	..	..	21	..
L. & N.	Birmingham, Ala.	....	..	60	..	..	..
M. P. (System)	Fulton, La.	....	12	..	..	..	..
G. C. L.	Blessing, Tex.	....	6	..	..	..	..
	Grayburg, Tex.	....	6	..	..	..	..
	Allenhurst, Tex.	....	6	..	..	..	..
	Graybill, Tex.	....	6	..	..	..	..
I. G. N.	Marlin, Tex.	....	..	19	..	..	..
	Palestine, Tex.	....	6	..	..	..	..
	Conroe, Tex.	....	6	..	..	..	..
N. Y. C. (System)							
I. H. B.	Elsdon, Ill.	Union	..	..	..	24	5
N. Y. C.	South Bend, Ind.	G.R.S.	..	204	..	..	..
	Collinwood, Ohio	G.R.S.	..	129	..	..	..
	Berea, Ohio	G.R.S.	..	91	..	..	..
O. C. L.	Fostoria, Ohio	G.R.S.	..	90	..	..	..
N. Y. C. & St. L.	Claypool, Ind.	....	..	..	..	..	6
	Linden, Ill.	....	..	..	..	4	8
	Lerna, Ill.	....	..	..	..	4	2
N. P.	Tacoma, Wash.	G.R.S.	31	..	..	..	..
St. L.-S. F.	Liberal, Mo.	....	25	..	..	..	..
	Girard, Kan.	....	20	..	..	..	..
S. P.	Newark, Cal.	G.R.S.	..	32	..	..	..
U. P. (System)							
O. S. L.	Clearfield, Utah	Union	4	..	..	..	..
	Sandy, Utah	Union	4	..	..	..	..
U. P. (R. R.)	Kansas City, Kan.	....	..	17	..	..	..
	Topeka, Kan.	....	..	58	..	..	..
Wabash	Granite City, Ill.	....	..	..	..	..	..
Totals	New: Plants 34 / Levers 1,585		156	1,325	..	73	31
	Rebuilt, not listed in table: Plants 10 / Levers 142		44	8	49	36	8

A new type of electrically-operated crossing gate controlled automatically by track circuits, has been tested during 1928 at three crossings and one road has under construction the installation of these automatic gates at 26 crossings.

Construction Under Way

At the close of 1928, construction was under way on 42 different signal installations on 18 roads, involving 1,178.7 miles of road and 1,958 signals. These installations are scattered from Massachusetts to Texas, indicating that construction programs are being pushed through to completion without regard to winter weather.

Interlocking construction is under way on 32 new

plants, involving 573 levers and 24 plants are being rebuilt, involving 283 additional levers. Remote control layouts and centralized control installations are under way at 19 points. Eight spring switch installations and 10 automatic interlocking plants are under way.

Good Prospects for 1929

Twenty-two roads have already decided on signaling programs for 1929. The report of work contemplated includes automatic signals on 2,359.3 miles of road, involving 2,320 signals. This total is considerably in excess of that contemplated at this time last year.

Over 34 new interlocking plants, involving 1,585 levers, are definitely planned for 1929, and at 10 plants that are to be rebuilt, 142 levers are to be added. Decided activity in the construction of automatic interlocking plants is indicated by the report that 65 such installations are scheduled for 1929. Also over 21 remote control and centralized control installations are planned for this year.

Many roads have not yet completed their budgets for 1929, and other roads authorize installations individually as the need arises throughout the year. Now that the train control situation has been relieved by the recent report of the Interstate Commerce Commission it is expected that numerous signal and interlocking projects that have been held in abeyance for the last year and a half will be authorized. All evidence, therefore indicates that construction for 1929 will exceed that of 1928.

Table G—Remote Power Switch Facilities Installed in 1928

Road	Location	Layout	Manufacturer	Remote Control: Desk Levers	Remote Control: Switch Machines
A. T. & S. F.	Santa Fe Junction, Kan.	Jct.	Union	4	
	Bartlesville, Okla.	Jct.	Union	5	1
	Attica, Kan.	Siding	Union	4	2
	Amarillo, Tex.	Term.	Union	6	4
	Ft. Sumner, N. M.	Siding	Union	4	2
	Vaughn, N. M.	Term.	Union	2	1
	Encino, N. M.	Siding	Union	4	2
	Mountainair, N. M.	Siding	Union	2	1
	Scholle, N. M.	Siding	Union	4	2
	Becker, N. M.	Siding	Union	4	2
	Belen, N. M.	Yard	Union	2	1
	Pueblo, Colo.	Jct.	....	..	4
	Pedernal, N. M.	Pass. Trk.	....	4	2
	Taiban, N. M.	Pass. Trk.	....	4	2
	Melrose, N. M.	Pass. Trk.	....	4	2
	Yeso, N. M.	Pass. Trk.	....	4	2
	Texico, N. M.	Jct.	....	..	9
	Lubbock, Tex.	Xing.	....	..	1
	Waynoka, Okla.	Term.	....	..	10
	Wellington, Kan.	Term.	....	..	5
	Marietta, Okla.	Pass. Trk.	Union	8	4
	N. Ft. Worth, Tex.	Jct.	G.R.S.	..	1
	Beaumont, Tex.	Jct.	Union	8	4
	Carrizo, Ariz.	Jct.	Union	2	1
	Dalies, N. M.	Pass. Trk.	G.R.S.	..	1
A. C. L.	Orlando, Fla.	Xing.	Union	4	..
B. & O.	Massillon, Ohio	Xing.	....	6	..
	Botkins, Ohio	Xover.	....	2	1
	Wapakoneta, Ohio	Xover.	....	2	1
	Bond, Md.	Xover.	....	3	..
B. & M.	Somerville, Mass.	Jct.	Union	5	..
	Brattleboro, Vt.	Jct.	Union	2	1
	* Hoosac Tunnel, Mass.	Jct.	Union	2	1
	Bellows Falls, Vt.	Jct.	Union	3	1
	Claremont Jct., N. H.	Jct.	Union	2	1
C. N.	Saskatoon, Sask.	Jct.	G.R.S.	3	3
C. P.	Grenfell, Sask.	E.D.T.	Union	1	1
	Indian Head, Sask.	E.D.T.	Union	1	1
	* Dunmore, B. C.	D.T.C.	G.R.S.	4	4
	Glacier, B. C.	Outly.	G.R.S.	1	1
C. & N. W.	Proviso, Ill.	Yard	G.R.S.	2	1
	Proviso, Ill.	Frt. Hse.	G.R.S.	4	..
C. B. & Q.	Golden, Ill.	Xing.	....	2	..
	* Arenzville, Ill.	E.D.T.	Union	4	4
	Savanna, Ill.	Xing.	....	6	..
	Chapin, Ill.	Xing.	....	2	..
	Prescott, Wis.	Jct.	....	4	2
	Trevine, Wis.	Xing.	....	..	2
	Lincoln, Neb.	Xing.	....	4	1
	LaCrosse, Wis.	Jct.	G.R.S.	7	4
C. M. St. P. & P.	Camp Douglas, Wis	Xing.	Union	6	..
	Appleton, Minn.	Xing.	....	1	..
C. R. I. & P.	Des Moines, Iowa	Jct.	....	5	2
	Topeka, Kan.	Jct.	....	..	1
D. & H.	Scranton, Pa.	Xing.	....	4	2
D. & R. G. W.	* Tenn. Pass, Colo.	....	G.R.S.	8	2
D. T. & I.	Durban, Mich.	Jct.	Union	1	..
G. N.	Blackfoot, Mont.	E.D.T.	....	5	..
M. K. T.	Parsons, Kan.	Jct.	....	1	1
	Granger, Tex.	....	....	1	1
	Elgin, Tex.	....	....	2	2
M. P.	Various locations	....	....	..	6
N. Y. C.	Rockport, Ohio	Xover.	G.R.S.	12	2
M. C.	Detroit, Mich.	Jct.	G.R.S.	5	..
N. Y. C. & St. L.	Perry, Ohio	Xing.	Union	2	..
	Hibbard, Ind.	Xing.	Union	4	..
	Conneaut, Ohio	....	....	..	1
N. Y. N. H. & H.	Waterford, Conn.	....	....	4	2
Penna.	Hibbard, Ind.	Xing.	....	7	..
	Harmony, Ind.	....	....	..	1
P. M.	Plymouth, Mich.	Xing.	G.R.S.	4	..
	* Flint, Mich.	....	Union	16	8
S. P.	Marcel, Cal.	Jct.	Union	2	..
	Bealville, Cal.	Jct.	Union	3	..
	El Paso, Tex.	Jct.	Union	1	1
	Araz Jct., Cal.	Jct.	Union	5	4
S. P. (T. & L.)	Garrett, Tex.	Jct.	G.R.S.	2	1
	West Point, Tex.	Pass. Trk.	Union	2	1
	El Paso, Tex.	Term.	Union	4	2
T. & P.	* Colorado, Tex.	Pass. Trk.	G.R.S.	4	2
	* Weatherford, Tex.	Pass. Trk.	....	8	4
U. P. System	Tintic, Utah	Pass. Trk.	Union	2	1
L. A. & St. L.	Crestline, Nev.	Pass. Trk.	Union	4	2
	Islen, Nev.	Pass. Trk.	Union	2	1
	Cima, Cal.	Pass. Trk.	Union	2	1
	Crucero, Cal.	Xing.	Union	2	1
		Totals		312	136

* Centralized traffic control.

Table H—Spring Switches

	Number of Spring Switches: Installed in 1928	Under Construction	Contemplated for 1929
A. T. & S. F.	16	6	29
A. C. L.	1	..	..
B. & O.	4	..	..
C. N.	4	..	..
C. of G.	1	..	..
C. N. J.	1	..	..
C. B. & Q.	1	..	..
C. & E. I.	1	..	..
C. M. St. P. & P.	10	..	6
C. & N. W.	4	1	..
C. R. I. & P.	2	..	..
C. S. S. & S. B.	3	..	..
D. T. & I.	1	..	..
I. C.	6	1	..
K. C. S.	1	..	4
L. & N.	1	..	..
Me. C.	5	..	..
M. St. P. & S. S. M.	5	..	..
M. P.	2	..	..
N. & W.	8	..	..
N. P.	14	..	..
P. E.	17	..	5
P. M.	..	..	..
S. A. L.	..	..	..
Southern	..	..	..
S. P.	27	..	3
T. & L.	1	..	2
St. L.-S. F.	1	..	1
T. & P.	7	..	..
U. P.	11	..	..
O. S. L.	2	..	1
W. & L. E.	1	..	..
Total	158	8	51

Table I—Automatic Interlocking Construction

Road	Number of plants: Completed in 1928	Under Construction	Contemplated for 1929
A. T. & S. F.	..	3	8
C. N.	1	..	..
C. P.	4	..	..
C. G. W.	..	..	4
C. M. St. P. & P.	9	2	15
C. R. I & P.	3	..	..
C. & N. W.	5	..	..
D. T. & I.	..	..	3
G. N.	3	..	3
I. C.	1	..	..
K. C. S.	3	..	5
L. & N.	1	..	..
M. St. P. & S. S. M.	1	..	..
M. P.	3	..	..
N. Y. C. & St. L.	..	..	6
N. Y. N. H. & H.	1	..	..
N. Y. O. & W.	..	..	1
N. Y. C.	..	1	..
P. E.	..	..	6
St. L.-S. F.	3	3	..
S. P.	1	1	2
U. P.	..	..	1
St. J & G. I.	..	..	6
Wabash	1	..	4
W. P.	..	..	1
Totals	40	10	65

Train Control in 1928

Activities in automatic train control, on the part of the railroads during 1928, have been limited. The installations required on 44 roads under the two orders of the Interstate Commerce Commission issued in 1922 and 1924 were completed prior to the beginning of the year, with the exception of a limited mileage on five roads. This work was practically all finished and the installations placed in service some time prior to July, 1928, with the exception of a short section on the New York, New Haven & Hartford, now completed.

In addition to the installations required by the orders of the commission, the Southern, the Chicago & North Western, the New York Central and the Michigan Central had made extensions beyond those required by the orders of the commission, so that certain through routes might be equipped completely; as, for example, from Chicago to Omaha on the C. & N. W., from Chicago to Detroit, Boston, and Poughkeepsie on the New York Central lines, and from Cincinnati to New Orleans and Jacksonville on the Southern. During 1928, the New York Central extended installations from Poughkeepsie, N. Y., to Croton, 41.3 miles of road, from Rochester, N. Y., to Suspension Bridge, 73.3 miles of road and in conjunction with the Michigan Central, from West Detroit, Mich., to Toledo, Ohio, 55 miles of double track. The Central of New Jersey made a voluntary extension from Matawan, N. J., to Atlantic Highlands, 11.5 miles of road.

The Pennsylvania has under construction the installation of locomotive cab signals, but without automatic control of the brakes, on 81 miles of road, 327 miles of track and 225 locomotives, on the New York division from North Philadelphia, Pa., to Manhattan Transfer, N. J. The wayside automatic signals on this line are to be retained.

Table J—Car Retarder Installations Completed During 1928

Road	Location	No. of Classification Tracks	No. of Towers	No. of Retarders	Rail ft. Retarders	No. of Power Switches	No. of Switch Signals	No. of Power Skates	Manufacturer
T. & P.	Lancaster Yard, Ft. Worth, Tex.	32	2	21	1,611	38	38	32	G.R.S.
State Line Generating Company	State Line, Ind.	4	1	4	....	3	0	0	Union
N. Y. C.	DeWitt Westward Yard, Syracuse, N. Y.	27	3	17	1,309	28	28	27	G.R.S.
L. V.	Coxton Yard, Coxton, Pa.	17	1	11	814	17	17	17	G.R.S.
		80	7	53	3,734	86	83	76	

Table K—Automatic Highway Crossing Protection

	Installed in 1928		Under Construction		Contemplated for 1929	
	Wig-Wag	Flashing Light	Wig-Wag	Flashing Light	Wig-Wag	Flashing Light
A. C. & Y.	6	..	..	..	10	..
A. T. & S. F.	50	..	3	..	25	..
A. C. L.	1	43*	..	..	..	..
B. & O.	..	104	..	..	..	..
B. & L. E.	..	1	..	..	..	8
B. & M.	1	..	..	..	..	..
B. R. & P.	1	16	..	4	..	26
C. N.	28	16	..	..	..	..
C. P.	10	1	..	..	..	..
C. of Ga.	..	6	..	..	..	..
C. N. J.	..	48	..	..	..	..
C. V.	..	..	..	..	..	10
C. & O.	..	12	..	6	..	32
C. & A.	..	3	..	1	..	..
C. B. & Q.	..	4	..	..	..	..
C. & E. I.	..	28	..	..	..	12
C. G. W.	..	4	..	..	..	1
C. M. St. P. & P.	70	50	..	..	..	..
C. & N. W.	281	30	..	15	..	..
C. St. M. & O.	2	4	..	..	..	..
C. R. I & P.	..	22	..	..	..	..
C. S. S. & S. B.	..	2	..	..	..	..
C. I. & L.	1	12	..	4	..	6
D. L. & W.	..	7	..	11	..	16
D. T. & I.	..	6	..	..	..	12
E. J. & E.	..	4	..	..	..	16
Erie	..	125	..	20	..	150
I. C.	..	47	..	10	..	..
K. C. S.	4	6	..	..	5	6
L. V.	..	18	..	..	..	..
L. I.	..	46	..	2	..	4
L. H. & St. L.	1	1	..	..	..	..
L. & N.	..	55	..	41	..	..
M. K. T.	1	28	..	..	..	..
M. P.	20	15	..	..	..	..
I. G. N.	..	..	..	..	..	20
G. C. L.	..	..	..	..	..	10
N. C. & St. L.	3	2	..	..	..	..
N. Y. C.	1	164	..	55	..	..
T. & O. C.	2	39	..	..	..	4
C. C. C. & St. L.	2	14	..	..	..	..
M. C.	14	41	..	..	19	12
I. H. B.	..	4	..	4	..	2
N. Y. C. & St. L.	..	74	..	..	..	11
N. Y. N. H. & H.	..	61	..	..	..	20
N. Y. O. & W.	..	12	..	4	..	6
N. & W.	18	..	..	..	..	..
P. E.	22	..	..	..	34	..
Penna.	..	199	..	9	..	..
P. M.	..	54	..	..	..	..
P. & S.	..	..	..	..	..	2
Reading	..	71	..	6	..	19
S. A. L.	..	..	..	..	..	..
Southern	..	..	..	..	..	..
S. P.	56	..	..	..	22	..
T. & L.	7	..	..	..	..	..
St. L.-S. F.	7	..	..	..	..	..
T. & P.	10	..	..	..	..	..
U. P.	15	2	..	..	..	..
O. S. L.	20	..	..	..	15	..
L. A. & S. L.	7	..	..	..	5	..
St. J. & G. I.	2	..	..	..	..	..
Virginian	1	1	..	..	..	..
Wabash	..	70	..	..	..	14
W. & L. E.	5	6	..	..	..	..
Totals	669	1,578	3	192	135	419

*Traffic type light signals.

Commission Issued Important Decision

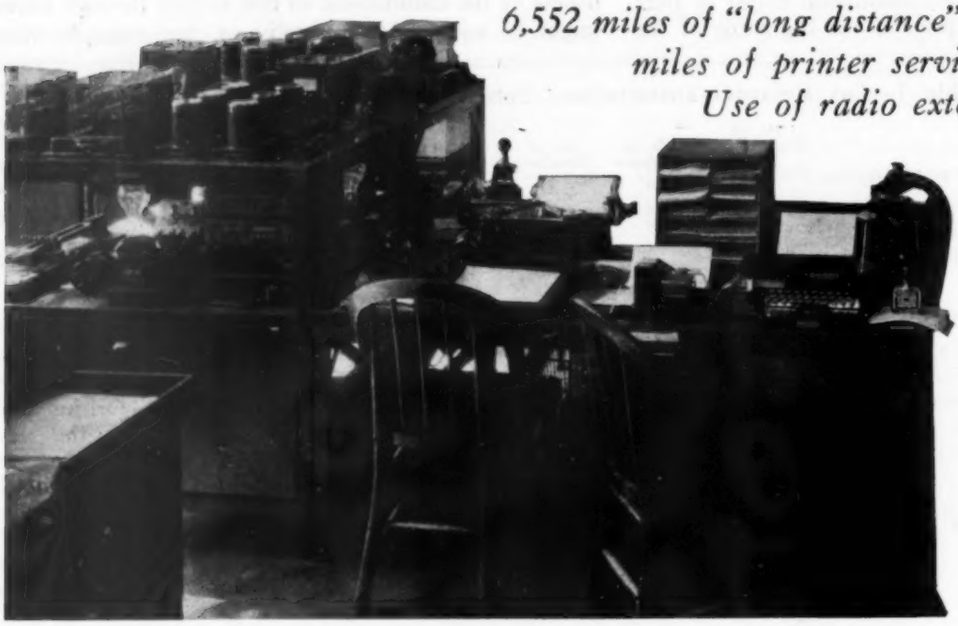
The most important action of the Interstate Commerce Commission during 1928, in reference to train control, was the report issued November 26, which contained a statement to the effect that a far greater measure of safety is to be expected from vigorous efforts to provide adequate protection against the large number of accidents that arise from causes other than the disregard of fixed signals, than from requiring by order special efforts to extend train control installations. The commission concluded not to require by order at the present time any further installations of train-stop or other train control devices.

However, cab signaling of the continuous type now in use on the Pennsylvania was recognized by the commission as an important forward step in the art of signaling, and the road is expected to conduct tests on its mountain division between Altoona, Pa., and Pittsburgh with a view to equipping that division, if satisfactory results are obtained.

In view of the report of the commission, it is to be expected that the activities in train control during 1929 will be devoted primarily to studies leading to standardization, and developments of continuous cab signals without automatic control of the brakes. It is evidently not the intent of the commission that the carriers are to abandon development of train control or similar devices. In fact the Bureau of Safety is instructed to keep in touch with progress being made by the roads, and it is stated specifically in the report that the case is left open for further orders if required.

Technical Advances Feature 1928 Communications Activities

6,552 miles of "long distance" circuits and 3,114 miles of printer service installed—Use of radio extended



Printing Telegraph Equipment Installed in the Santa Fe Offices at Topeka, Kan.

By R. S. Kenrick

Associate Editor,

Railway Age

IMPROVED telephone and telegraph facilities were provided on a large number of steam railroads during 1928, with beneficial results in the way of greater economy of communication service and more prompt handling of business. Statistically, the most important features of the construction activities in this field of railway operation were the addition of 34,144 miles of copper wire, chiefly for telephone dispatching and long distance telephone circuits, and the addition of 136,184 miles of telegraph circuits. The corresponding figures for 1927 were 53,932 miles of copper wire and 147,432 miles of telegraph circuits. However, the copper wire installed in 1928 was only slightly less than the 39,790 miles installed in 1926.

The comparatively large increase, both during 1928 and 1927, in the mileage of telegraph circuits is accounted for by the extension of the carrier current system on the two large Canadian railroad telegraph systems. For instance, the Canadian National increased its telegraph circuit capacity to the extent of 126,948 miles during 1928, while the Canadian Pacific made an increase in its facilities of this type to the extent of 100,000 miles.

From a technical standpoint, the noteworthy development is the continued experimentation with radio communication for front to rear-end communication on long freight trains. One of these tests was made on a mountainous division of an eastern road and information concerning it has not yet been published. This section of road has a large number of tunnels and for this reason the physical conditions for a radio test were not ideal. As a matter of fact, the tests were purposely made in this mountainous territory in order to subject the radio equipment to the most unfavorable conditions possible. On the whole, satisfactory results were secured, although the radio apparatus did not operate while either the engine or caboose of the freight train was inside of a tunnel. When, however, the engine was on one side of the tunnel and the caboose on the other, it was possible to maintain communication. These tests will be continued for several months and it is anticipated that improvements in equipment will result from the experiments.

This review, which is our ninth annual one of the railway communication field, has been compiled from data received from 99 railroads in the United States and Canada.

1928 Construction Activities

The principal changes in communication plant during 1928 and the comparative figures for 1927 are shown in Table A. The comparative figures show clearly that the activity in the communication field was sharply reduced in 1928, as compared to the year previous. This is pointedly indicated in the construction of only 6,552

Table A—Principal Increases in Plant Facilities During 1928 and Comparisons with Increases in 1927

		Miles 1928	1927
New or rebuilt pole lines:			
Railroad owned	3,378		
Commercially owned	3,885		
Jointly owned	1,634		
Total		8,897	10,241
Copper wire installed:			
Railroad owned	21,959		
Commercially owned	13,125		
		35,084	53,932
Road mileage dispatched by telegraph		†2,032	†5,340
Road mileage dispatched by telephone		3,723	6,438
Long distance telephone lines		6,552	24,552
Telegraph dispatching circuits		5,686	20,024
Telegraph circuits (all types)		136,184	147,432
Printing telegraph circuit mileage		7,125	12,300
Printing telegraph machines installed		59	96

† Decrease.

miles of long distance telephone circuits as compared to 24,552 miles in 1927. There was also a decrease from 20,024 miles to 5,686 miles in the amount of new telephone circuits provided for train dispatching. The comparative figures for miles of road dispatched by telegraph and miles of road dispatched by telephone show that the trend which has been noticeable for many years is still continuing. However, the mileage dispatched by telegraph decreased only 2,032 in 1928, as compared to a decrease of 5,340 miles in 1927. The increase in road mileage dispatched by telephone, 3,723 miles, compared with 6,438 miles in 1927.

To provide better and more economical telegraph service, nine railroads installed 59 printing telegraph machines last year as compared to 96 such machines installed in 1927. Although the increase in printing telegraph service was less than during 1927, it is none the less significant that 59 printers were placed in service on a circuit mileage of 7,125. Owing to the fact that many of the installations made in 1928 were for yard and terminal service, the printing telegraph circuit mileage installed last year is considerably smaller than that installed in 1927, when 12,390 miles of circuit was added. Of the 59 machines, 18 were placed in service on one railroad, to provide an intercommunicating system at several of its large terminals. These machines are of the page printing type and replaced telautograph equipment (which transmits the handwriting of the operator). Another outstanding installation of telegraph printers was 11 machines on the Eastern region of the Pennsylvania.

The diversified applications of the printing telegraph machine are well illustrated by several replies from superintendents of telegraph. One eastern railroad has provided telegraph printers for operation between various superintendent's headquarters and also between superintendent's headquarters and regional headquarters, thus eliminating all Morse telegraph operation. On a southwestern road telegraph printers have been installed in the larger terminals to connect the diversion office, service bureau, yard office, perishable freight office, and the superintendent's office at various terminals for the purpose of expediting the handling of car diversions, billing and train make-up.

Technical Developments During 1928

During the year one large eastern road completed the installation of telephone message circuits over approximately 80 per cent of its system. These circuits connect with private branch exchanges as well as with the dispatchers' offices and with all way stations. With the installation of these new telephone circuits, additional phantom circuits are provided over the dispatching and message circuits for the purpose of long distance telephone communication. Another eastern road has made a substantial reduction in wire testing facilities by consolidating divisional testing offices wherever two or more divisions terminate. That is, wire testing facilities are now provided for the centralized testing of wires of all divisions which terminate at the testing office. In order to increase the efficiency of the telephone service, one railroad has provided additional places where trainmen may communicate by telephone with the dispatcher.

One of the largest railway systems in the country installed 2,600 miles of long distance trunk telephone circuits during the year to handle increased traffic. These telephone trunk circuits use copper wires of a larger size than heretofore used in this service, in order to reduce to a minimum the number of telephone repeaters necessary to give the circuit the desired transmission characteristics. This railroad also installed a number of vacuum tube telephone repeaters in order to extend the range of its long distance telephone service and secures the "B" battery supply for its telephone repeaters directly from rectifiers connected to the 110-volt a-c. supply line, instead of from storage batteries.

Table B—Mileage of Principal Copper Wire Installations in 1928

Road	Railroad owned	Commercially owned	Total
C. N.	2,110	4,349	6,459
C. P.	940	2,212	3,152
M. P. (System)	2,928	484	3,412
Penna.	2,404	249	2,653
C. M. St. P. & P.	2,510	....	2,510
N. Y. N. H. & H.	2,120	....	2,120
U. P. (System)	827	611	1,438
B. & M.	1,047	363	1,410
G. N.	1,318	....	1,318
S. P. (System)	776	457	1,233
St. L.-S. F.	556	506	1,072
Reading	779	196	975
I. C.	706	169	875
N. Y. C. (System)	285	451	736

One Canadian road reports greater efficiency and reliability of operation of its telephone train dispatching equipment by the substitution of alternating-current for direct-current apparatus. In reconstructing its lines, one road has transposed and arranged copper telegraph circuits for future telephone service. The greater efficiency of the telephone, as compared with the telegraph, for train dispatching service has enabled one railroad to consolidate two dispatching divisions.

Work Under Construction

At the close of 1928, there was a comparatively small volume of work under construction. However, the statistics compare favorably with similar data for the corresponding period of 1927. Ten roads reported that they are rebuilding or constructing 552 miles of pole line, while 15 other roads reported that the commercial telegraph companies were adding 1,236 miles of pole line, and five roads reported the construction or reconstruction of 1,296 miles of jointly-owned pole line. The amount of railroad-owned pole line work under construction at the end of the year compared favorably with the corresponding amount at the end of 1927, but the comparative figures for the commercially-owned lines and the jointly owned lines show a striking increase, as follows: (1928) 1,236 as compared with 673 miles in 1927; and (1928) 1,296 miles as compared with 766 miles at the end of 1927. Copper wire to the extent of 7,462 miles was being strung at the end of 1928. This figure is considerably larger than the 3,968 miles of wire which was in process of stringing at the end of 1927. This noteworthy increase is accounted for by the installation of 5,000 miles of commercially-owned copper wire on the Louisville & Nashville. At the end of the year, long distance telephone circuits, to the extent of 756 miles, were being installed and 1,073 miles of dispatchers' telephone circuits were under construction. One railroad had six printing telegraph machines about to go in service at one of its large terminals.

Contemplated for 1929

Table C summarizes the information pertaining to 1929 improvements received from 46 roads. It must be recognized however that the figures are incomplete, inasmuch as the majority of the roads have not yet approved their 1929 budgets. However, if comparison is made with the table published in the *Railway Age* of January 7, 1928, it is seen that the railroads are anticipating a much larger increase in copper wire mileage in 1929 than they did for 1928. For example, 25 roads

reported their intention of adding 18,742 miles of copper wire in 1929, as compared with an anticipated increase in copper wire mileage during 1928 to the extent of 15,347 miles. The commercial telegraph companies contemplate the installation of 19,717 miles of copper wire in 1929, this figure being more than three times the expected increase in commercially-owned copper wire mileage at the beginning of 1928. The railroad and commercial telegraph companies, which have reported to date, anticipate the addition of 38,459 miles of copper wire in 1929, whereas the actual construction in 1928 totaled only 31,932 miles and it must be realized that the amount actually installed always exceeds the amount anticipated, owing to the incompleteness of the returns because of unfinished budgets.

Table C—Principal Items Contemplated for 1929

		Miles
New or rebuilt pole lines:		
Railroad owned	2,573	
Commercially owned	2,704	
Jointly owned	1,632	
Total		6,909
Copper wire:		
Railroad owned	18,741	
Commercially owned	19,717	
Total		38,458
Road mileage dispatched by telegraph will decrease		1,055
Road mileage dispatched by telephone will increase		1,708
Long distance telephone lines		7,450
Telephone dispatching circuits		1,964
Telegraph circuits (all types)		2,288
Printer circuit mileage		1,703
Printing machines		17

Four railroads reported that 17 telegraph printers will be installed this year, 10 of these machines being reported by a single eastern road. The principal copper wire installations contemplated for 1929 are listed in Table D.

Future Technical Developments

Further development and improvement in the use of radio for communication between the front and rear end of long freight trains, and for dispatching tug boats in harbors is anticipated as an outstanding technical development of the near future. This comparatively recent communication agency is now undergoing intensive development, in which a number of railroads are lending a hand, in order that an improved radio system will be evolved which will be an effective aid in freight train operation. Another possible radio application is for yard engine service at hump yards.

Table D—Mileage of Principal Copper Wire Installations Contemplated for 1929

Road	Railroad owned	Commercially owned	Total
C. N.	4,138	5,424	9,562
C. P.	....	....	....
L. & N.	648	1,300	1,948
N. Y. N. H. & H.	1,852	....	1,852
B. & M.	1,615	173	1,788
C. & O.	1,700	....	1,700
M. P. (System)	1,583	....	1,583
U. P. (System)	1,223	....	1,223
A. T. & S. F.	743	104	847
Erie	699	147	846
C. M. St. P. & P.	719	....	719
I. C.	402	137	539

The carrier current system, which has been adopted extensively in connection with the commercial business of the Canadian National and Canadian Pacific lines will be extended during 1929, and a number of telegraph superintendents look forward to the development of the carrier system of telegraphy and telephony to enable them to superimpose on existing circuits, the additional telegraph and telephone circuits which may be required, without the necessity of erecting additional wire facilities.

Several railroads anticipate a large increase in the use of printing telegraph machines, particularly for terminal operation. One road expects an increase in the use of multiplex printers between widely separated points to relieve the necessity of constructing additional wires. A continued increase in the number and length of long distance telephone circuits to connect the various headquarters, divisional and terminal offices of a railroad is anticipated by the majority of telegraph superintendents who have reported their views.

Railway Supply Prospects

(Continued from page 18)

Our concluding topic is income prospects. I have no hesitation whatever in offering the judgment that the income outlook has improved incalculably within 1928. Not because of an awakened anxiety among business men. That is yet to come. We are on that job. Still less is it because of any realization by those in governmental authority that there is a direct relation between railway preparations and railway preparedness on the one hand and the prosperity of their constituents on the other. That is yet to come, and we are on that job. What I mean is (1) that the railway managers themselves in private letters have disclosed during late months a determination to solve on their own initiative so far as in them lies, the problem of maintaining rates at a sound level, and (2) that the invitation to do so comes from the most significant of all sources, the power which can sanction the solution—the Interstate Commerce Commission.

All this represents a strong stirring of the deeps. Nothing in statistics or philosophy or other omens can compare in importance with such a psychological re-invigoration. It rises to the dignity of a harbinger—not only for the years beyond, when co-operative effort among the railways and with all others concerned may have been organized and systematized, but immediately, as throughout the country discussion of the future focuses the thought and energy of individual railway officers upon specific opportunities in the present. I know of no influence likelier than this to bring the railway supply industry a prosperous 1929.

* * *

Music Room in the C. P. R. Prince of Wales Train

Motor Coaches and Trucks More Widely Adopted

Railways inaugurate or extend motor vehicle services as competition sharpens—Motor Transport Division now active

By John C. Emery

Motor Transport Editor, *Railway Age*

THE operation by the railways of motor coaches for the transportation of passengers and of motor trucks and tractors and trailers for the transportation of freight expanded steadily during 1928. During the first three-quarters of the year, this expansion occurred at the steady but slow pace which had marked the previous two years, but in the last quarter the pace quickened to a marked extent. On the other hand, those factors and conditions which have led the railways to become agencies of transportation by highway as well as by railway, likewise continued to exert an increasing pressure upon them.

The operation of motor vehicles by the railways is no longer experimental. The experience of several years with motor coach and truck operation has served to demonstrate the benefits the railways can secure by utilizing the highways in conjunction with their railway lines. To some extent, the railways have engaged in motor vehicle operation, particularly motor truck operation, for the sole purpose of reducing the cost or bettering the quality of their service, but in more cases, probably, they have taken this step as a protective measure. They have been forced on the highways by competitive conditions which have exerted an adverse

Reading Co-ordinated Service at Atlantic City, N. J.

effect upon their revenues, particularly passenger but also, to some degree, freight as well. When it was found that railway trains, both passenger and freight, could not retain their traffic in the face of competition of private automobiles, motor coaches and motor trucks, some of the roads decided that a possible solution of the problem lay in their own use of highway vehicles. Consequently railway-operated motor coach and motor truck lines began to spring up, some of these replacing train service and others supplementing train service which was retained. Briefly, the results obtained by those railways which have been operating motor vehicles, as stated by them, have been to provide service on their highways at an expense appreciably less than would have been required to continue to provide service by rail; to improve the service rendered to patrons, whether as passengers or as shippers; and, in a number of instances, to recover passenger or freight traffic previously lost or to develop new sources of passenger revenue.

Important New Operations

The number of railways operating motor coaches and trucks continues to grow, the number of roads operating motor coaches, for example, having increased to approximately seventy-five during the past year, an increase of 25 per cent. The Reading is an outstanding example of the railways which began motor coach operation during 1928. Typical of the experiences of many other railways, this company's desire to engage in motor coach operation failed to coincide with its ability to do so by about two years, due to difficulty in securing the necessary certificates permitting it to engage in operations on the highways in its territory. Early this year, however, a charter and several operating certificates were secured and the Reading Transportation Company, the motor coach operating subsidiary of the railway, began to function actively. Each succeeding month saw further expansion of this company's lines, until at the present time it has a quite sizable system of motor coach routes. The Baltimore & Ohio, like the Reading, after lengthy litigation, obtained authority only recently to operate its first motor coach route in West Virginia. The Central of Georgia, the Richmond, Fredericksburg & Potomac, the Chicago & North Western, the Chicago, Milwaukee, St. Paul & Pacific, and the Chicago Burlington & Quincy are among other roads which began motor coach operation on a more or less extensive scale during 1928.

Plans for motor coach operations of magnitude were announced by three railways during the closing month of the year. Among these was the Pennsylvania, which secured a charter for its highway subsidiary, the Pennsylvania General Transit Company, and simultaneously applied for motor coach operating certificates paralleling its lines on two routes for the entire distance across the state of Pennsylvania from east to west. Although no official announcement has been made, the plans of the Pennsylvania, according to good authority, contemplate the establishment of motor coach lines throughout its widespread territory. In the southwest where railway operation of motor vehicles has been at a minimum, the Missouri Pacific and the St. Louis Southwestern announced similarly ambitious programs. The Missouri Pacific proposals, as already set forth, call for motor coach lines paralleling virtually all of its railway lines in the state of Arkansas and also paralleling several of its lines in Missouri. The Cotton Belt began in December the operation of motor coach lines paralleling its main line entirely across the state of Arkansas. Both of these roads are expected to extend their motor coach systems throughout their territories at an early date.

While these and other roads have been inaugurating their first motor coach operations, the roads which have had motor coach lines in operation for more than a year have continued to expand these services. Outstanding among such roads are the Boston & Maine, the New York, New Haven & Hartford, the Great Northern, the Union Pacific and the Southern Pacific. The New Haven continues to be the railway with the largest number of motor coaches, and the Great Northern, which recently established its first motor coach line at the western end of its system, continues to lead in the number of miles of routes operated. The Southern Pacific, however, is going ahead very rapidly, both in the number of coaches operated and in the number of miles of routes covered. Although only a year and a half old, the Southern Pacific Motor Transport Company now has more than 100 motor coaches in operation and is installing new lines at a rapid rate. During recent weeks it has put two long distance motor coach routes into service, one between San Francisco, Cal., and Portland, Ore., and the other between Los Angeles, Cal., and El Paso, Texas. One railway which had been operating motor coaches, the Chicago & Alton, disposed of its highway routes during the year, on account of developments arising from the fact that it is in receivership. The Alton expects, however, to re-engage in motor vehicle operation at a later date.

More Use of Motor Trucks

There have been fewer striking instances of new motor truck operation by railways during the past year. Several of these, however, should be mentioned. In the east, the Boston & Maine is now making extensive use of motor trucks in replacement of local freight train service, consolidating l.c.l. shipments at central points by means of motor trucks. The Central of New Jersey has established a motor truck line in replacement of way freight service between two points in New Jersey and has thereby effected considerable savings in operating expenses while at the same time improving the service rendered. In the west, the Great Northern has established its first motor truck route to handle l.c.l. way freight, and the Cotton Belt has instituted motor truck service for the handling of mail, baggage, express and freight on the same extensive lines in Arkansas over which it is operating motor coaches. The Pacific Electric, while not a steam railway, is a subsidiary of the Southern Pacific, and its projected motor truck operations are therefore of interest. This company has organized a subsidiary to operate motor trucks in coordination with its train service, the motor trucks picking up shipments at the shipper's door, carrying them to the railway, by which they are forwarded to their destination, and there taken by the company's trucks to the door of the consignee.

Most of the roads which had been operating motor trucks, tractors and trailers in freight service prior to the beginning of last year, continued to expand their operations along this line during 1928. The year also saw two important investigations of the railway use of motor vehicles in terminal service for freight handling, which were instituted by the Interstate Commerce Commission. These involved the terminal trucking arrangements at St. Louis, Mo., and at New York, and the proposed reports which were issued, while recommending some changes in practices, gave strong recommendation to motor trucks, tractors and trailers as adjuncts to the railways in their terminal operations.

The competitive aspect of motor transport continues to become more acute. Independent motor coach lines in particular, and also independent motor truck lines to some extent, are steadily becoming stronger, largely through widespread consolidations. During 1928 transcontinental motor coach service, whereby a passenger can ride from coast to coast in the motor coaches of one company, became a fact, and there are now an imposingly large number of motor coach systems with routes several thousand miles in length. The first "sleeper" motor coach has made its appearance, and while its practicability has yet to be proved it constitutes a distinct threat of still more intensive competition with railway trains.

Motor coach lines of one sort or another now cover most of the desirable routes in all parts of the country. Most of these, particularly those of an intrastate character, are operating under certificates granted by the state commissions, and the effect of this in several instances has been that railways desiring to replace train service with motor coach service along such routes have been forced to deal with the holders of the certificates.

The regulatory situation continues about as it was a year ago. Nearly all of the state commissions are now exercising regulatory control over the intrastate motor coach and motor truck lines under their jurisdiction, with the salutary effect of stabilizing the business. Owing to the fact that so many routes are already covered by certificated independent operations, however, the railways are finding it difficult to secure permission from the state authorities to operate motor coaches substituted for discontinued trains over the same routes, unless they purchase the companies or the lines of those companies holding the desired certificates. Recently, however, the Southern Pacific secured authority from the California Railroad Commission to substitute motor coach service for train service over routes already covered by independent operators. In this case, motor coach operation by the railway was held to be nothing more than a substitution for existing service, which might be made without regard to the presence or absence of other operators on the highways involved. In general the state commissions appear to be friendly to the desire of the railways to substitute motor vehicle service for unprofitable train service, but the fact that so many routes are already covered by certificates held by independent operators has constituted a real barrier.

There continues to be no regulation of common carrier motor coach and motor truck lines operating in interstate service, Congress having failed to take action upon various bills providing for such regulation which have been presented to it. The result of this has been that most of the important interstate routes are covered by three or more competing lines, and "cut-throat" practices have not been the exception. There seems to be little likelihood that federal legislation affecting interstate motor vehicles will be enacted at the current short session of the present Congress, but it is considered probable that some such action will be taken early in the deliberations of the next Congress.

At the present time, indications are that 1929 will see developments with respect to railway operation of motor vehicles which will overshadow such developments in 1928 or in previous years. It is known that most of the important railways of the country which have not already engaged in motor coach or motor truck operation are now actively making surveys of their territories to determine where they should begin operation on the highways. The Motor Transport Division of the American Railway Association has had its first regular meetings which have been marked by steadily increasing attendance and enthusiasm. This division is expected to be an important factor in the continued expansion of railway motor transport operations.

Orders for Motor Vehicles

Available statistics on purchases of highway vehicles continue fragmentary. In the first place, vehicles owned by contractors employed exclusively in railway work are not reported by the railroads. Secondly, a large percentage of vehicles used by railways or their subsidiaries in highway operations were acquired through purchases of independent operators and thus are not listed as purchases of individual units. Finally, many sales to railways are made by local dealers and are therefore not known to the manufacturers.

Consequently orders reported in the appended table are restricted to those supplied by railroads. During the year these reporting railways list purchases of 227 motor coaches, 68 trucks and 51 passenger automobiles, made by themselves or subsidiaries.

Orders for Highway Vehicles

Railroad	No.	Type of vehicle	Model designation	Seating capacity or truck capacity in tons	Purchased by railroad or subsidiary	Where to be used	Manufacturer
Akron, Canton & Youngstown	1	Sedan	.....	5 Pass.	Railroad	Traffic	Studebaker
Atchison, Topeka & Santa Fe	1	M. Coach	.....	16	Subsidiary	Pass.	General Motors
	1	Truck	Stake Body	1½ ton	Subsidiary	Freight	Ford
Boston & Albany	2	Truck	.....	2-5	Railroad	Stores	.....
Boston & Maine	5	M. Coach	508-2C4	29	Railroad	Pass.	A. C. F. Motors
	5	M. Coach	Model Y	29	Railroad	Pass.	General Motors
	4	M. Coach	Model Y	29	Railroad	Pass.	General Motors
	1	M. Coach	A B 4	29	Railroad	Pass.	Mack
	2	M. Coach	75	21	Railroad	Pass.	Studebaker
	1	Coupe	.....	.....	Railroad	Frt. Trf.	Ford
	1	Coupe	.....	.....	Railroad	Frt. Trf.	Ford
	1	Coupe	.....	.....	Railroad	Pass. Trf.	Ford
	1	Truck	.....	1½ ton	Railroad	Trouble Car	Ford
	1	Truck	.....	1½ ton	Railroad	Freight	Ford
	1	Truck	.....	1½ ton	Railroad	M. of W.	Ford
Central of Georgia	1	M. Coach	Parlor	29	Subsidiary	Pass.	Mack
	1	M. Coach	Parlor	29	Subsidiary	Pass.	General Motors
Chicago, Burlington & Quincy	1	M. Coach	Pass.Bagg.&Mail	21	Subsidiary	Pass.	Reo
Chicago Great Western	1	Truck	Speed	1	Railroad	Shop	Chevrolet
Chicago River & Indiana	1	Truck	Panel Top	½ ton	Railroad	Mail	General Motors
	1	Truck	Stake Body	2 ton	Railroad	M. of E.	General Motors
	1	Truck	Open Express	½ ton	Railroad	M. of E.	General Motors
Cincinnati, New Orleans & Texas Pacific	4	Pass.	Touring	5	Railroad	Employee	Ford
	1	Pass.	Sedan	5	Railroad	Employee	Ford
Cincinnati Northern	1	Truck	.....	1 ton	Railroad	Employee	Graham-Dodge
Clev., Cin., Chicago & St. Louis	1	Pass.	.....	5	Railroad	Employee	Hudson-Essex
	1	Roadster	.....	2	Railroad	Employee	Ford
	1	Truck	.....	1¼ ton	Railroad	Commissary	Dodge
Copper Range	1	M. Coach	Model 53	21	Subsidiary	Pass.	White

Railroad	No.	Type of vehicle	Model designation	Seating capacity or truck capacity in tons	Purchased by railroad or subsidiary	Where to be used	Manufacture
Delaware, Lackawanna & Western	1	Truck	S. F. 46	2	Railroad	Freight	Int. Harvester
Denver & Rio Grande Western	1	Truck	BJ	3½-5	Subsidiary	Freight	Mack
	1	Truck	SF-46	2	Subsidiary	Freight	Mack
	1	Truck	4S-54	2½	Subsidiary	Freight	Mack
	2	M. Coach	Suburban	29	Subsidiary	Pass.	Mack
East Tennessee & Western N. C.	1	Truck	Model 58	2	Subsidiary	Freight	White
Great Northern	2	M. Coach	Parlor	29	Subsidiary	Pass.	.....
	6	M. Coach	Parlor	29	Subsidiary	Pass.	.....
	20	M. Coach	Parlor	34	Subsidiary	Pass.	.....
Illinois Central Railroad	2	Truck	Model SF	1½ tons	Railroad	Storehouse	Int. Harvester
Long Island	1	Sedan	.....	7	.....	.....	.....
Los Angeles & Salt Lake	1	M. Coach	Parlor	28	Railroad	Pass.	General Motors
	1	M. Coach	Parlor	28	Railroad	Pass.	Smith Fageol
	1	M. Coach	Parlor	28	Railroad	Pass.	White
	1	M. Coach	Parlor	26-28	Railroad	Pass.	Mack
	1	M. Coach	Parlor	28	Railroad	Pass.	A. C. F. Motors
Missouri-Kansas-Texas	1	Sedan	Dictator	3	Railroad	Employee	Studebaker
	1	M. Coach	SL-36	20	Railroad	Employee	Int. Harvester
	1	Truck	SL-46	2	Railroad	Stores	Int. Harvester
New York Central	1	Roadster	Model 96	½ ton	Railroad	Shop	Willys-Overland
	1	Truck	K-72-B	3½ ton	Railroad	M. of W.	General Motors
New York, New Haven & Hartford	1	Truck	Panel Body	1½	Railroad	M. of W.	Graham
	1	Truck	Tex	2½	Railroad	M. of W.	Graham
	1	Delivery	Model A	.....	Railroad	M. of W.	Ford
	1	Truck	Model LE	1¾	Railroad	M. of W.	Graham
	1	Truck	Dump	1¾	Railroad	M. of W.	Graham
	6	M. Coach	Interurban	29	Subsidiary	Pass.	Mack
	5	M. Coach	Street Car	39	Subsidiary	Pass.	Versare
	15	M. Coach	Observation	29	Subsidiary	Pass.	A. C. F. Motors
	1	M. Coach	Observation	29	Subsidiary	Pass.	A. C. F. Motors
	14	M. Coach	Interurban	29	Subsidiary	Pass.	Yellow Coach
	4	Sedan	Four Door	.....	Subsidiary	Employee	Chrysler
	1	Sedan	Two Door	.....	Subsidiary	Employee	Chrysler
Norfolk & Western	2	Truck	.....	2	Railroad	.....	Graham
Oregon-Washington	2	M. Coach	Parlor	27	Railroad	Pass.	A. C. F. Motors
Pacific Electric	2	M. Coach	Double Deck	58	Railroad	Pass.	Fageol
	5	M. Coach	Single Deck	40	Railroad	Pass.	Twin Coach
	2	M. Coach	Double Deck	63	Railroad	Pass.	Yellow
	1	Truck	Screen Body	.....	Railroad	M. of W.	General Motors
	3	M. Coach	Single Deck	19	Railroad	Pass.	Fageol
Pennsylvania	1	Truck	.....	½	.....	.....	.....
	2	Truck	.....	1	.....	.....	.....
	3	Truck	.....	1½	.....	.....	.....
	3	Truck	.....	2	.....	.....	.....
	3	Truck	.....	2½	.....	.....	.....
	2	Truck	.....	3	.....	.....	.....
	2	Truck	.....	5	.....	.....	.....
	1	Coupe	.....	2	.....	.....	.....
	4	Sedan	.....	5	.....	.....	.....
	3	Sedan	.....	7	.....	.....	.....
Reading	16	M. Coach	Club-coach	29	Subsidiary	Pass.	Mack
	7	M. Coach	Club-coach	20	Subsidiary	Pass.	Studebaker
	2	M. Coach	Sedan	5	Subsidiary	Employee	Chevrolet
	1	Truck	Delivery	1	Subsidiary	Shop	Ford
	1	Sedan	.....	5	Railroad	Employee	Dodge
Richmond, Fredericksburg & Potomac	5	M. Coach	Suburban	29	Subsidiary	Pass.	Mack
Southern	3	Truck	Model SF-46	2	Railroad	Shop	Int. Harvester
Southern Pacific	1	Truck	.....	3½	Railroad	.....	.....
	1	Truck	.....	2	Railroad	.....	.....
	1	Truck	.....	1½	Railroad	.....	.....
	1	Truck	.....	1¾	Railroad	.....	.....
	4	Truck	.....	¾	Railroad	.....	.....
	3	Truck	.....	Light Del.	Railroad	.....	.....
	5	Sedan	.....	.....	Railroad	.....	.....
	1	Coupe	.....	.....	Railroad	.....	.....
	12	Coach	.....	.....	Railroad	.....	.....
	12	M. Coach	.....	29	Subsidiary	.....	.....
	6	M. Coach	.....	27-29	Subsidiary	.....	.....
	2	M. Coach	.....	27	Subsidiary	.....	.....
	10	M. Coach	.....	25	Subsidiary	.....	.....
	11	M. Coach	.....	22	Subsidiary	.....	.....
	14	M. Coach	.....	17-21	Subsidiary	.....	.....
	2	M. Coach	.....	16	Subsidiary	.....	.....
	3	M. Coach	.....	14	Subsidiary	.....	.....
	1	M. Coach	.....	11	Subsidiary	.....	.....
	2	Truck	.....	1¼	Subsidiary	.....	.....
	1	Truck	.....	1	Subsidiary	.....	.....
	1	Truck	.....	¾	Subsidiary	.....	.....
	3	Sedan	.....	.....	Subsidiary	.....	.....
St. Louis Southwestern	8	M. Coach	Parlor	29	Subsidiary	Pass.	White
	4	M. Coach	Parlor	20	Subsidiary	Pass.	Yellow
	3	M. Coach	Parlor	12	Subsidiary	Pass.	Flexible
	2	Truck	Closed	2½ Ton	Subsidiary	Bag. & Frt.	White
	1	Truck	Closed	3 Ton	Subsidiary	Bag. & Frt.	White
Spokane, Portland & Seattle	6	M. Coach	Semi-parlor	29	Subsidiary	Pass.	Fageol
	2	Sedan	.....	7	Subsidiary	Pass.	Cadillac
Union Pacific	2	M. Coach	Parlor	22	Subsidiary	Pass.	Am. Car & Fdy.
Wheeling & Lake Erie	1	Truck	Model 50	2	Railroad	Misc.	General Motors

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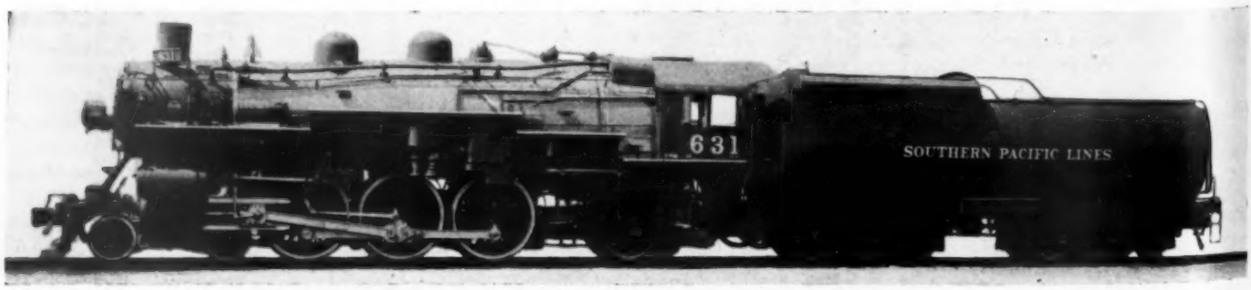
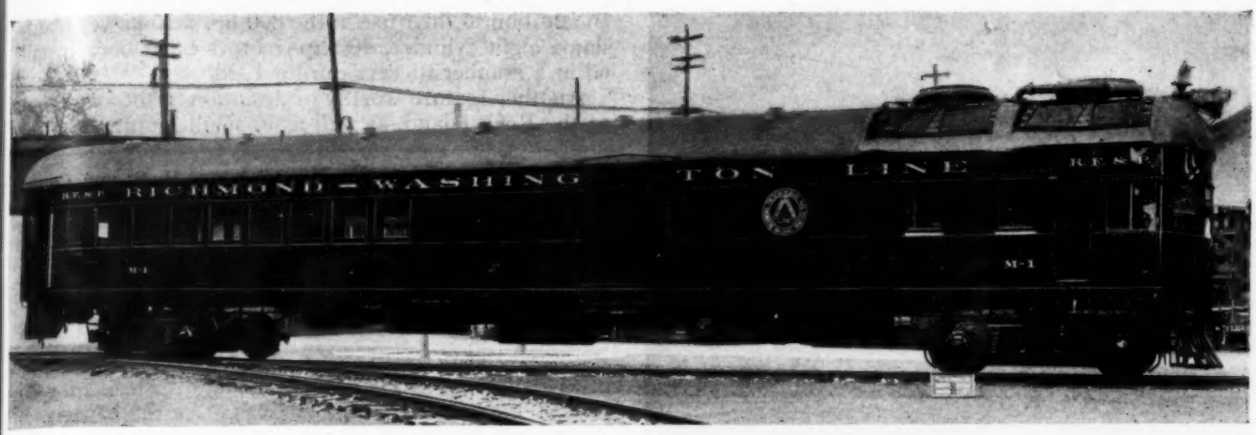


Southern Pacific 4-6-2 Type Locomotive Built by the Baldwin Locomotive Works—43,660 lb. Tractive Force—Total Tractive Force with Booster, 53,300 lb.



A 73-ft. Car Built by the J. G. Brill Company—Two Hall-Scott 275-hp. Motors, with Westinghouse Electrical Equipment

Rail Motor Car Orders in 1928

Power plant capacities reach 800 hp.—Use of distillate continues—The application of the Diesel engine is extended

By C. B. Peck

Mechanical Department Editor, *Railway Age*

ORDERS were placed in the United States and Canada for 194 rail motor cars and trailers during 1928. Of the total, 175 were for service in the United States, of which 153 were motor cars and 22 were trailers. The table below shows a comparison of the orders during the past year with those placed during preceding years.

Relatively few modern self-propelled passenger cars were placed in service on the steam railroads of North America prior to 1922. Since that time approximately

Orders for Rail Motor Cars and Trailers

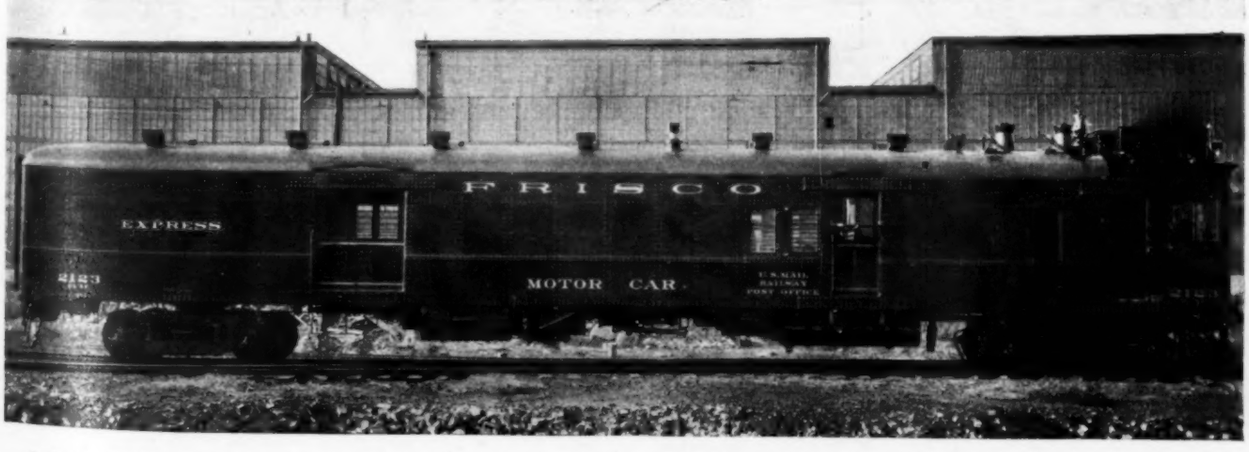
	1922	1923	1924	1925	1926	1927	1928
For service in the U. S.	51	77	120	149	142	180	175
For service in Canada..	7	3	12	7	4	9	10
For export	1	22	...	34	32	12	9
Total	59	102	132	190	178	201	194
Motor cars	50	93	112	171	161	176	172
Trailers	9	9	20	19	17	25	22

800 cars of this type have been built for railroad use, of which approximately 440 are equipped with electric transmissions and the remainder with mechanical transmissions. During the same period about 150 trailer cars have been built for service in trains with the motor cars.

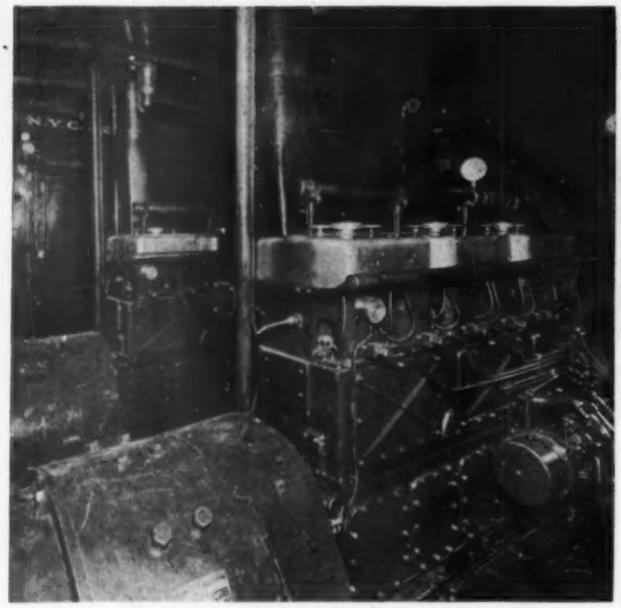
Almost from the beginning of the purchase of these cars there has been a demand for increasingly larger power plant capacities. While the weights of the earlier motor cars varied from less than 25,000 to 50,000 lb., by far the greater number of the cars now being built weigh well over 100,000 lb. The trend toward the

Power Plant Capacity of Rail Motor Cars, U. S. and Canada

Horsepower	1925	1926	1927	1928
100 or less.....	13	14	2	5
Over 100 to and including 125.....	5	7	..	1
Over 125 to and including 150.....	9	..	..	3
Over 150 to and including 175.....	20	1	..	1
Over 175 to and including 200.....	49	3	3	1
Over 200 to and including 250.....	36	65	43	13
Over 250 to and including 300.....	2	26	76	64
Over 300 to and including 350.....	..	..	..	24
Over 350 to and including 400.....	2	..	..	17
Over 400	..	19	16	25
Unclassified	..	..	24	7



A 72-ft. Motor Car with a 400-hp. Eight-Cylinder Electro-Motive Power Plant—Built by St. Louis Car Company



An Electro-Motive Double Power Plant, 440 hp. Capacity

larger power plants and greater weights is indicated in two of the tables which show the comparative figures for the years 1925 to 1928, inclusive.

The increasing field of service for the self-propelled car is suggested by the installation during 1928 of several dual power plants of 800-hp. capacity in converted postal cars on the Chicago, Rock Island & Pacific. These cars are not only available for motor passenger service, but will also be used as locomotives for branch line freight-train service. These power plants are also interesting in that they mark the introduction of the eight-cylinder motor into the rail car power plant field. In addition to their use in the 800-hp. dual power plants, single eight-cylinder, 400-hp. motors have been installed in a number of cars during 1928.

Another feature worthy of attention in the large units of the Rock Island, as well as in smaller units on a few other railroads, is the use of distillate instead of gasoline as the fuel for these engines. As the capacity of the power plants increases, the economic value of a cheaper fuel, which can be burned with carburetor equipment, becomes more pronounced than in the case of cars equipped with smaller size power plants.

Comparison of Rail Motor Car Weights, U. S. and Canada

Weights	1925	1926	1927	1928
25,000 lb. and under	6	7	..	..
Over 25,000 lb. to and including 50,000 lb.	19	7	..	..
Over 50,000 lb. to and including 75,000 lb.	74	2	4	..
Over 75,000 lb. to and including 100,000 lb.	27	79	29	5
Over 100,000 lb. to and including 125,000 lb.	7	32	88	69
Over 125,000 lb. to and including 150,000 lb.	..	5	21	53
Over 150,000 lb.	..	1	..	9
Unclassified	..	..	26	22

A number of cars have been built with power plants rated at 600 hp. A glance at the table showing the range of power plant capacities indicates the growth in the power plant capacity of the single-engine unit which, with a maximum for the year of 400 hp., has entered the capacity range in which the double power plant is being employed. It is this increasing capacity of the single-motor unit which has permitted the development of total power plant capacities of 600 and 800 hp. which have appeared during the past year.

The Diesel engine entered the rail motor car field in the United States during 1928. Orders were placed during the year for several cars equipped with Beardmore Diesel engines which have been successfully utilized in this service in Canada by the Canadian National System.

A list of orders for rail motor cars and trailers placed during 1928 follows.

Orders for Rail Motor Cars and Trailers

For Service in the United States

Purchaser	No.	Motor or Trailer	Type of power plant	Horsepower	Seating capacity	Length of bagg. compt. Ft.	In.	Weight	Builder
Atchison, Topeka & Santa Fe	1	Motor	Gas-electric (Converted)	275	62	15	0	95,000	Co. Shops-Electro-Mot.
Atlanta & St. Andrews Bay	1	Motor	Gasoline	200	30	18	0	61,000	Edwards-Buda
	2	Motor	Gasoline	100	28	9	0	23,000	Edwards-Buda
Baltimore & Ohio	1	Motor	Gas-electric	600	58	28	8½	151,300	St. Steel-Sterling-West
	2	Trailer	.....	...	82	.....		84,700	Standard Steel
	1	Trailer	.....	...	..	49	0	75,000	J. G. Brill Co.
Central of Georgia	1	Motor	Gasoline	92	29	22	0	34,000	Brill-Continental
Chesapeake & Ohio	1	Motor	Gasoline	92	38	11	3	30,500	Brill-Continental
	3	Motor	Gas-electric	300	40	20	0	119,000	Brill-Hall Scott-West.
	3	Motor	Gas-electric	300	40	20	0	119,000	Brill-Hall Scott-G. E.
Chicago & North Western	2	Motor	Gas-electric	275	..	46	1½	109,000	Pullman-Electro-Motive
	1	Motor	Gas-electric	275	40	16	8	110,000	Pullman-Electro-Motive
	1	Motor	Gas-electric	275	35	34	9	106,800	Pullman-Electro-Motive
	1	Motor	Gas-electric	275	53	.....		107,200	Pullman-Electro-Motive
	2	Motor	Gas-electric	400	70	.....		130,000	Pullman-Electro-Motive
	2	Motor	Gas-electric	300	40	16	4½	115,000	Pullman-Electro-Motive
	1	Motor	Gas-electric	600	32	32	8½	140,000	Pullman-Electro-Motive
	2	Motor	Gas-electric	300	..	35	10	113,000	Pullman-Electro-Motive
	3	Motor	Gas-electric	600	..	41	2	138,000	Pullman-Electro-Motive
Chicago, Burlington & Quincy	1	Motor	Gas-electric	275	24	28	5	113,650	Pullman-Electro-Motive
	1	Motor	Gas-electric	275	29	30	8	104,750	Pullman-Electro-Motive
	2	Motor	Gas-electric	400	..	43	3	134,800	Pullman-Electro-Motive
	1	Motor	Gas-electric	275	29	40	8	113,000	Pullman-Electro-Motive
	2	Motor	Gas-electric	400	..	33	3	126,000	Pullman-Electro-Motive
	1	Motor	Gas-electric	275	22	21	4	104,000	Pullman-Electro-Motive
	2	Motor	Gas-electric	275	..	39	9	104,000	Pullman-Electro-Motive
Chicago Great Western	2	Motor	Gas-electric (Converted)	275	60	18	0	95,000	Co. Shops-Electro-Mot.
	1	Motor	Gas-electric (Converted)	300	60	18	0	99,000	Co. Shops-Electro-Mot.
Chicago, Milwaukee, St. P. & Pac.	1	Motor	Steam	450	..	33	0	100,000	Ry. Locomotor Co.
Chicago, Rock Island & Pacific	8	Motor	Gas-electric	275	42	16	8	109,000	St. Louis Car-Elec.-Mo.
	3	Motor	Gas-electric	240	42	16	8	109,000	Cummings-Mack Int.
	3	Motor	Gas-electric (Converted)	800	..	.....		160,000	Co. Shops-Electro-Mot.
Chic., St. Paul, Minn. & Omaha	1	Motor	Gas-electric	600	25	25	7½	138,500	Pullman-Electro-Motive
	1	Motor	Gas-electric	600	30	22	8½	138,500	Pullman-Electro-Motive
	1	Motor	Gas-electric	600	20	20	4½	145,800	Pullman-Electro-Motive
	1	Motor	Gas-electric	600	..	38	2	144,800	Pullman-Electro-Motive
Colorado & Southern	1	Motor	Gas-electric	400	27	22	0	137,000	Pullman-Electro-Motive
	1	Motor	Gas-electric	400	..	60	0	136,000	Pullman-Electro-Motive

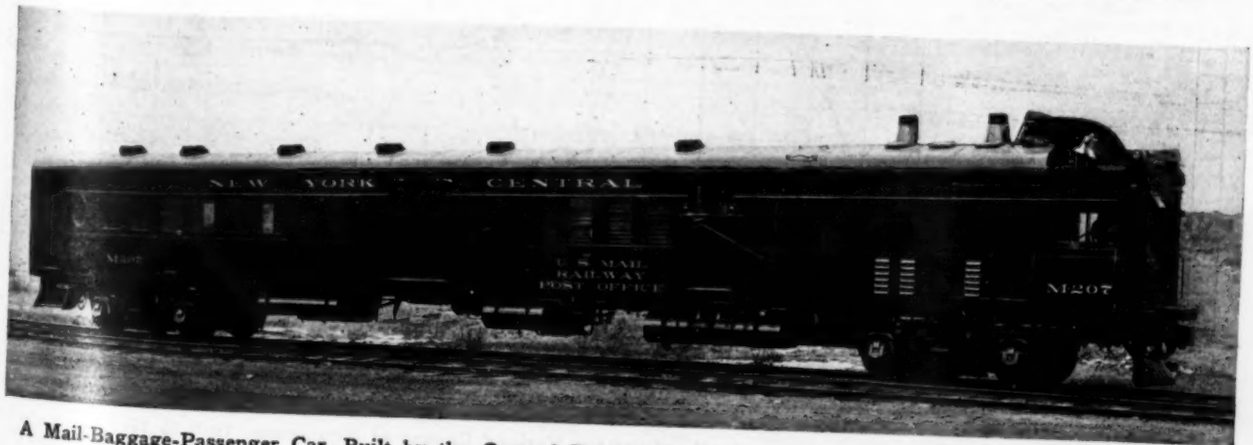
Purchaser	No.	Motor or Trailer	Type of power plant	Horse-power	Seating capacity	Length of bagg. compt. Ft.	In.	Weight	Builder
Columbus & Greenville	2	Motor	Gas-electric	300	17	31	0	115,000	Brill-Hall Scott-West.
	2	Trailer	.....	...	74	.....		80,000	J. G. Brill Co.
Cumberland & Pennsylvania	1	Motor	Gas-electric	600	61	16	6	154,000	Brill-Hall Scott-West.
Detroit & Mackinac	1	Motor	Gas-electric	...	..	.....		.....	J. G. Brill Co.
Great Northern	5	Motor	Gas-electric	300	..	15	1	112,000	Brill-Hall Scott-West.
International Motor Co.	1	Motor	Gas-electric	135	59	10	0	60,000	Cumm.-Mack Int.-West.
Lehigh & Hudson River	1	Motor	Gas-electric	500	52	16	6	152,380	Brill-Westinghouse
Lehigh Valley	1	Motor	Gas-electric	220	49	13	7¾	76,800	St. Louis-Electro-Mot.
Louisiana & Arkansas	1	Motor	Gasoline	70	38	11	3	30,000	Brill-Midwest
Louisville & Nashville	1	Motor	Gas-electric	275	58	9	4	92,880	Brill-Hall Scott-G. E.
Maryland & Pennsylvania	1	Motor	Distillate-elec.	440	57	.....		120,000	St. Louis-Electro-Mot.
Minnesota & International	1	Motor	Gas-electric	275	..	46	9½	110,000	Std. Stl.-Elec.-M.-West.
Missouri Pacific	4	Motor	Gas-electric (Converted)	220	52	12	0	90,000	Co. Shops-Electro-Mot.
Mobile & Ohio	3	Motor	Gas-electric	440	..	41	4	128,000	St. Louis-Elec.-Motive
	3	Trailer	.....	...	95	72	8	72,000	St. Louis Car
New York Central	1	Motor	Gas-electric	240	75	15	3	116,200	Mack International
Northern Pacific	2	Motor	Gas-electric	300	32	22	2 1/16	119,125	Std. Stl.-Elec.-M.-West.
	1	Motor	Gas-electric	300	52	26	0	115,000	Brill-Hall Scott-West.
Okla. C.-Ada-Atoka	1	Motor	Gasoline	225	..	40	9	49,000	St. Louis Car-Sterling
	1	Trailer	.....	...	32	.....		37,000	St. Louis Car
	1	Trailer	.....	...	50	.....		37,000	St. Louis Car
Pennsylvania	1	Motor	Gas-electric	275	35	32	3	121,600	Pullman-Electro-Motive
	4	Motor	Gas-electric	275	73	10	3	122,775	Pullman-Electro-Motive
	1	Motor	Gas-electric	275	62	15	9	122,300	Pullman-Electro-Motive
	6	Motor	Gas-electric	350	73	10	3	131,997	Brill-Westinghouse
	1	Motor	Gas-electric	240	71	15	9	115,160	Brill-Internat. Motors
	10	Motor	Gas-electric	350	77	10	5	131,000	Pullman-Brill-G. E.
	1	Motor	Gas-electric	350	62	18	8	131,000	Pullman-Brill-G. E.
	2	Motor	Gas-electric	350	57	21	5	131,000	Pullman-Brill-G. E.
	1	Motor	Gas-electric	400	72	9	6	153,000	Pullman-Electro-Motive
Rapid City, B. H. & Western	2	Motor	Oil-electric	330	72	9	6	141,000	Pullman-West.
Reading	1	Motor	Gasoline	123	30	9	0	23,600	Edwards-Buda
	1	Motor	Gas-electric	600	39	12	11½	137,100	Brill-Hall Scott-West.
	2	Motor	Gas-electric	360	31	14	4	137,100	Cummings-Mack Int.
	1	Motor	Gas-electric	360	64	14	4	137,100	Bethlehem-Mack Int.
	1	Trailer	.....	...	73	.....		62,200	Cummings
	3	Trailer	.....	...	73	.....		60,000	J. G. Brill Co.
	1	Motor	Oil-electric	330	34	14	6	.....	Bethlehem-West.
	1	Motor	Oil-electric	330	..	.....		.....	Westinghouse
	1	Motor	Gas-electric	350	39	14	4½	136,000	Brill-Westinghouse
	3	Motor	Gas-electric	500	39	12	11	155,000	Brill-Westinghouse
Southern Pacific	1	Motor	Gas-electric	600	55	14	0	155,000	Brill-Hall Scott-West.
Southern Pacific, Tex. & La.	1	Motor	Gas-electric	405	84	12	7	126,100	Cummings-Mack Int.
	2	Motor	Distillate-elec.	300	..	45	0	114,000	Beth.-Electro-Motive
	1	Motor	Gas-electric	300	..	45	0	107,500	Pullman-Elec.-M.-West.
Spokane, Port. & Seattle	1	Motor	Gas-electric	300	..	45	0	110,000	St. Steel-Sterling-West.
	1	Motor	Gas-electric (Converted)	175	..	.....		.....	Co. Shops-Brill-West.
St. Louis-San Francisco	5	Motor	Gas-electric	400	..	40	4¼	131,340	St. Louis-Elect.-Motive
	2	Motor	Gas-electric (Converted)	220	60	15	0	96,000	Co. Shops-Electro-Mot.
Tonopah & Tidewater	1	Motor	Gas-electric	275	45	28	11	.....	St. L.-Elec.-Mot.-West.
Union Pacific	2	Motor	Gas-electric	275	44	23	6	112,280	Brill-Hall Scott-West.
	4	Motor	Gas-electric	275	74	.....		110,600	Pullman-Electro-Motive
	8	Trailer	.....	...	..	.....		76,900	Pullman
	2	Motor	Gas-electric (Converted)	275	..	37	10	100,000	Co. Shops-Brill-West.

Canada

Purchaser	No.	Motor or Trailer	Type of power plant	Horse-power	Seating capacity	Length of bagg. compt. Ft.	In.	Weight	Builder
Canadian National	7	Motor	Oil-electric	330	57	27	3	142,000	Can. C. F.-Oil E.-West.
Manitoba Power Co., Ltd.	1	Motor	Oil-electric	185	27	24	5½	100,000	National Steel
Winnipeg Elec. Co.	1	Motor	Gas-electric	135	59	10	0	60,000	Cummings-Mack Int.
			Gas-electric	135	59	10	0	60,000	Cummings-Mack Int.

Export

Purchaser	No.	Motor or Trailer	Type of power plant	Horse-power	Seating capacity	Length of bagg. compt. Ft.	In.	Weight	Builder
Argentine State Rys.	2	Motor	Gasoline	100	38	.....		23,000	Edwards-Wisconsin
Consolidated Railroads of Cuba	2	Motor	Gasoline	78	47	11	3	31,000	Brill-Hall Scott
Panama Railroad (C. Z.)	1	Motor	Gasoline	123	30	9	0	23,600	Edwards-Buda
Tranvia de Oriente (Colombia)	3	Motor	Gasoline	100	Freight	24	0	17,900	Edwards-Buda
Uruguay State R. R.	1	Motor	Gas-electric	78	38	11	3	32,000	Brill-Hall Scott



A Mail-Baggage-Passenger Car, Built by the Osgood Bradley Car Company, Equipped with an Electro-Motive Company Double Power Plant

Railway Equipment Prices

Slight increase in price indexes of all equipment except passenger cars—Steel freight cars show lowest increase compared with pre-war

By James G. Lyne
Financial Editor, *Railway Age*

THE latest detailed price averages on railway cars and locomotives compiled by the Eastern Group, Presidents' Conference Committee on Federal Valuation, are shown in the chart and table published herewith. The latest data shown in them cover purchases made in the year 1927, with figures for preceding years as far back as 1910 given for purposes of comparison. In the chart variations are shown in percentage relationship to the average prices for the base years 1910-1914. The table shows not only the percentage variations but also the number of units included in the computation and the actual average price expressed in cents per pound.

Average Equipment Prices, 1925, 1926, 1927

(Expressed in percentages of average prices per lb. 1910 to 1914)

	1927	1926	1925
Locomotives	236	230	208
Freight Cars, all-steel	180	184	169
Freight Cars, composite	197	196	195
Passenger train cars, all-steel	196	201	201

The information is based on the selling price of the entire output of two large locomotive builders and six large car companies, with certain irrelevant items (such as foreign business) excluded.

The table and chart reproduced here show slight decreases from 1926 in prices of all-steel passenger cars and freight cars, a slight increase in that of locomotives and virtually no change in composite freight cars. In general, the table and chart show a variation in the price of equipment as compared with the pre-war years ranging from an 80 per cent increase in the case of all-steel freight cars to 136 per cent in the case of locomotives. 1927, as disclosed by these figures, is shown in the small table.

The figures which are available to show price trends in 1928 are fragmentary and are not readily comparable with the 1927 figures compiled by the Presidents' Conference Committee. They are disclosed in the form of total approximate cost of each unit as reported to the Bureau of Finance of the Interstate Commerce Commission when applications are filed for approval of the issue of equipment trust certificates. These figures do not include all equipment ordered during the year, but only that upon which equipment trust certificates were issued.

Prices in 1928

While average prices of various classes of equipment cannot for 1928 be worked out on the same scientific basis as the Presidents' Conference Committee shows them for 1927—nevertheless, by describing insofar as possible in the tables each unit which is priced, a tendency to show comparisons of incomparable things is avoided. Thus, a certain locomotive of the Pacific type may cost twice as much as another of similar type but much smaller in size. The tables shown herewith, compiled from the reports of the Interstate Commerce Commission's Bureau of Finance, and explained by information of the *Railway Age's* own seeking, give the essential details about each order listed so that at least to some degree, size, design, weight and such factors

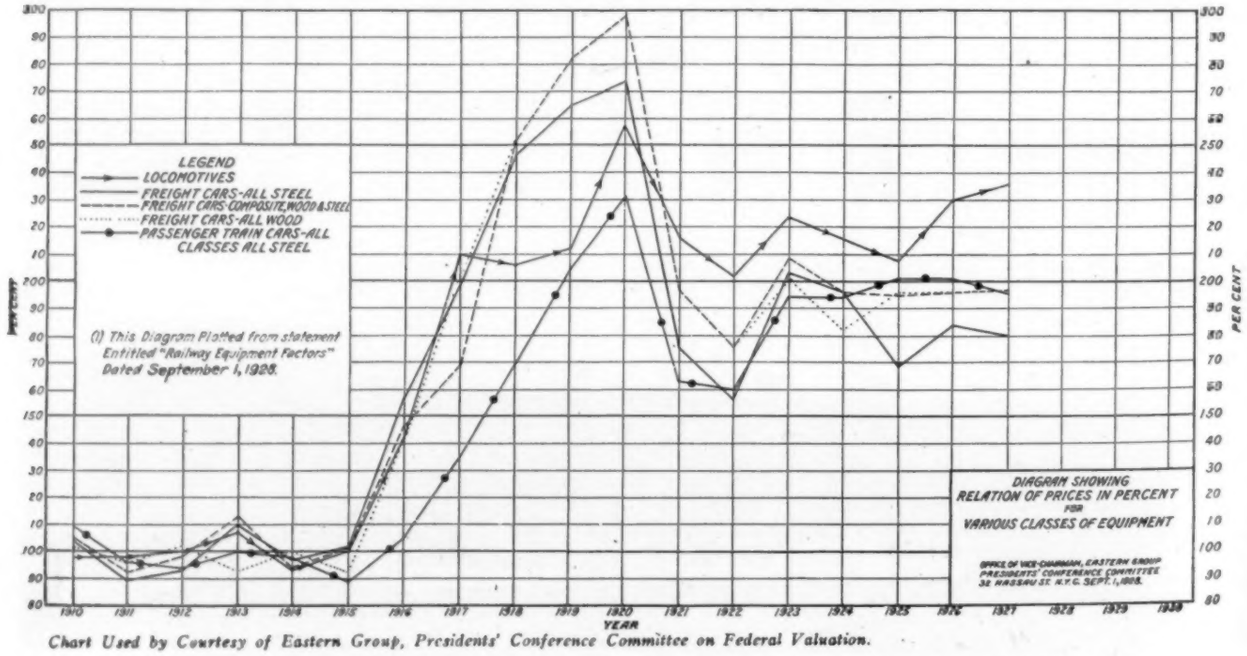

LEGEND
LOCOMOTIVES
FREIGHT CARS-ALL STEEL
FREIGHT CARS-COMPOSITE, WOOD & STEEL
FREIGHT CARS-ALL WOOD
PASSENGER TRAIN CARS-ALL CLASSES ALL STEEL
(1) This Diagram Plotted from statement Entitled "Railway Equipment Factors" Dated September 1, 1928.
DIAGRAM SHOWING RELATION OF PRICES IN PERCENT FOR VARIOUS CLASSES OF EQUIPMENT
PER CENT
YEAR

Chart Used by Courtesy of Eastern Group, Presidents' Conference Committee on Federal Valuation.

Diagram Showing Relation of Prices in Per Cent for Various Classes of Equipment, 1910 to 1927

Railway Equipment Factors

STATEMENT SHOWING THE NUMBER OF UNITS SOLD, THE WEIGHTED AVERAGE PRICE PER POUND AS SOLD (EXCEPT WHERE ESTIMATED, SEE NOTE NO. 4) AND THE PER CENT OF INCREASE IN PRICE

Year or period	Locomotives			Freight Cars: All Steel			Freight Cars: Composite Wood and Steel			Freight Cars: All Wood			All-Steel Passenger train cars (Steel underframe and all wood cars —See note 4-d)	
	No. of locos.	Price per lb.	Per cent	No. of cars	Price per lb.	Per cent	No. of cars	Price per lb.	Per cent	No. of cars	Price per lb.	Per cent	No. of cars	Per cent
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1910-1914, incl. base	10,583	7.385c	100	71,108	2.57c	100	148,047	2.51c	100	53,349	2.26c	100	4,116	100
1910	2,901	7.265	98	10,455	2.68	104	18,555	2.63	105	13,739	2.30	102	799	109
1911	1,608	7.255	98	13,850	2.30	89	32,918	2.31	92	13,720	2.17	96	508	96
1912	3,269	7.350	100	17,803	2.39	93	46,348	2.47	98	17,665	2.31	102	821	94
1913	2,066	7.890	107	22,598	2.83	110	25,898	2.84	113	2,600	2.11	93	1,212	100
1914	739	6.873	93	6,402	2.49	97	24,328	2.37	94	5,625	2.25	100	776	98
1915	981	7.413	100	13,050	2.63	102	24,752	2.54	101	4,350	2.11	93	396	89
1916	2,170	10,542	143	21,307	4.01	156	14,650	3.67	146	12,396	3.19	141	687	105
1917	1,586	15.513	210	4,750	5.11	199	14,500	4.25	169	3,200	4.54	201	548	135
1918	1,976	15.225	206	12,383	6.36	247	43,000	6.35	253	None	*5.72*	*253*	16	169
1919	273	15.637	212	None	*6.82*	*265*	None	*7.09*	*282*	None	*6.37*	*282*	31	205
1920	1,458	19.074	258	13,480	7.03	274	12,950	7.47	298	None	*6.73*	*298*	553	231
1921	326	15.923	216	4,200	4.50	175	12,450	4.94	197	None	*4.45*	*197*	47	163
1922	1,910	14.924	202	32,181	4.00	156	51,597	4.39	175	None	*3.96*	*175*	1,182	160
1923	1,726	16.551	224	19,875	5.21	203	26,140	5.24	209	4,800	4.54	201	407	194
1924	1,109	15.919	216	46,433	5.05	196	26,300	4.92	196	3,795	4.12	182	862	194
1925	816	15.326	208	20,776	4.34	169	24,090	4.90	195	600	4.42	196	842	201
1926	960	16.999	230	6,825	4.73	184	15,146	4.93	196	None	*4.43*	*196*	697	201
1927	506	17.415	236	12,150	4.62	180	19,737	4.95	197	None	*4.45*	*197*	877	196

NOTES—(1) The data on rolling equipment is based on the total selling price of the entire output of two large locomotive and six large car companies with certain sales excluded such as the Pershing locomotives and locomotives and cars sold to foreign countries.

(3) The price per pound is a weighted average composite price of all classes of equipment coming under each of the general headings.

(4) All prices and percentages shown in above table were determined from actual data furnished by the manufacturers with the exception of those in italics which were estimated in the following manner:—

(a) ALL STEEL FREIGHT CARS. COMPOSITE FREIGHT CARS—Price and percentage for 1919 were derived by interpolating between actual prices reported for 1918 and 1920 (1st 6 mos.).

(b) ALL WOOD FREIGHT CARS—The percentages for composite cars were used and from these percentages the price per pound was calculated using the weighted average price of all wood freight cars for 1910 to 1914, incl., as base, or 100 per cent.

(c) ALL STEEL PASSENGER TRAIN CARS—Derived by interpolating between "Trend of Price" factors shown in Equipment Committee's reports (Passenger Train Car Report, dated June 1, 1921, and Supplements).

(d) WOOD WITH STEEL UNDERFRAME AND ALL WOOD PASSENGER TRAIN CARS—No sales reported (except eight for Steel Underframe) 1915 to 1927, incl. If sufficient wooden cars had been sold to make the market, it is felt that the increase in price over the weighted average price 1910 to 1914, incl., would have been at least as great as that for all steel cars; therefore the percentage factors shown for all steel passenger train cars (Col. 15) are recommended for application to the wood with steel underframe and all wood passenger train cars.

may be given their proper weight in connection with the price figures.

In the tabulations are included the name of the road, the number of units of each type of equipment ordered, the approximate price of each unit, and the serial designation of the equipment trust certificates covering it. All this information is made public by the Bureau of Finance of the Interstate Commerce Commission. Where the units covered in these descriptions issued by the Bureau of Finance can be readily identified with orders for equipment reported to the *Railway Age*, then, for the purpose of these tables other pertinent information, such as the size, weight and name of builder is added to that supplied by the Bureau of Finance.

Equipment orders in 1928 have not been heavy and of the total orders only a portion are covered by equipment trust certificates and have thus found their way into these tabulations. Since these tables, therefore, cover only a part of the market in a year when orders have not been representative, they cannot assume positively to present a general picture of average conditions in the entire market. Only when the Presidents' Conference Committee has worked out its averages for the year 1928 will it be possible to know conclusively whether the prices given herewith reflect the average conditions which have prevailed.

Explanatory Note.—The data are given in some detail so that the varying prices may be reconciled with the varying sizes and character of the equipment. It is, of course, impossible in the small space available to explain these variations in full, and there may be some cases where cars and locomotives of approximately the same character may be found to have different prices on different orders. The explanation usually is that there is some extenuating factor that does not appear in the records.

Thus, in the case of passenger cars there could be instances of two dining cars ordered by different railroads at approximately the same time, one of which cars might cost more than the other. The explanation in such case might be that the more expensive car had more elaborate interior furnishings.

Locomotive Prices in 1928

(See explanatory note in text)

Road	No.	Type	Weight	Tractive force	Builder	Unit price	Date of order	Equipment trust series
Chicago & North Western	12	2-8-2	395,000	.....	American	$97,000	March, 1927	T
	8	0-8-0	225,000	.....	American	49,600	March, 1927	T
Erie	35	2-8-4	461,470	71,000	Baldwin	100,043	May	..
	1	Oil-Elec.	132,000	36,000	Ing. Rand-Am. Gen. Elec.	57,000	September	..
Mobile & Ohio	8	0-6-0	164,000	.....	American	34,600	Dec., 1927	Q
	5	2-8-2	293,000	.....	American	53,300	Dec., 1927	Q
Seaboard Air Line	25	0-6-0	.....	.....	Baldwin	39,500	Dec., 1927	BB
Southern	28	2-8-2	.....	.....	Baldwin	56,000	Dec., 1927	BB
	2	2-8-2	.....	.....	Baldwin	69,000	Dec., 1927	BB
	8	Mallet	.....	.....	Baldwin	89,000	Dec., 1927	BB
	5	4-6-2	.....	.....	Baldwin	57,000	Dec., 1927	BB
Southern Pacific	8	4-8-2	368,000	57,510	Company Shops	84,506	May	K
	10	4-8-8-2	614,600	112,760	Baldwin	128,603	April	K
	3	4-6-2	313,800	43,660	Baldwin	74,513	April	K
Texas & Pacific	15	2-10-4	452,000	84,600	Lima	102,337	March	A
Texas & Pacific	15	2-10-4	452,000	84,600	Lima	102,667	January	B
	5	4-8-2	361,400	54,700	Baldwin	97,834	March	B

Freight Car Prices in 1928

(See explanatory note in text)

Road	No.	Type	Capacity	Construction	Builder	Unit price	Date of order	Equipment trust series
Chicago & North Western	500	Box	100,000	.....	.....	$2,230	.....	T
	25	Caboose	.....	.....	.....	2,695	.....	U
	100	Gondola	140,000	.....	.....	2,270	.....	U
	500	Flat	100,000	.....	.....	1,712	.....	U
	500	Hopper	140,000	.....	.....	2,532	.....	U
Chicago, Milwaukee, St. Paul & Pacific	500	Stock	80,000	St. Und'frame	.....	1,820	.....	
	100	Ore	140,000	Steel (Roll St. Wheels)	.....	2,224	.....	
	500	Hopper	140,000	Steel	.....	$2,351	.....	
	2,500	Box	100,000	St. Und'frame	.....	2,120	.....	
	300	Automobile	100,000	St. Und'frame	.....	2,269	.....	
	500	Stock (single deck)	80,000	St. Und'frame	.....	1,680	.....	
	150	Stock (double deck)	80,000	St. Und'frame	.....	1,760	.....	
	500	Hopper	140,000	Steel	.....	2,355	.....	
	2	Flat	400,000	St. Und'frame	.....	7,369	.....	
	500	Automobile	100,000	St. Und'frame	.....	2,699	.....	
	100	Ore	140,000	Steel (Chill. Iron Wheels)		2,127	.....	..
Erie	500	Box	80,000	Steel	Pressed Steel	2,124	June	..
	400	Automobile	80,000	Steel	Standard Steel	2,547	June	..
	100	Furniture	80,000	Steel	Magor	3,100	June	..
Mobile & Ohio	250	Box	80,000	St. Und'frame	Mt. Vernon	1,600	January	Q
	250	Gondola	100,000	St. Und'frame	Mt. Vernon	1,625	January	Q
	200	Flat	100,000	St. Und'frame	Gen. Amer. Car	1,340	January	Q
	20	Caboose	.....	.....	Company Shops	2,250	.....	Q
St. Louis-San Francisco	500	Automobile	100,000	St. Und'frame	Pullman	2,197	February	CC
	500	Flat	100,000	St. Und'frame	Gen. Amer. Car	1,580	February	CC
	6	Air-dump	100,000	Steel	Magor	3,986	March	CC
	700	Box	100,000	St. Und'frame	Am. Car & Fdy.	2,012	February	CC
	300	Box	100,000	St. Und'frame	and	2,014	February	CC
	500	Box	100,000	St. Und'frame	Gen. Amer. Car	2,014	February	CC
	700	Hopper	110,000	Steel	Pullman	1,692	February	CC
	300	Hopper	110,000	Steel	Gen. Amer. Car	1,683	February	CC
	500	Hopper	110,000	Steel	Am. Car & Fdy.	1,687	February	CC
Southern	2,500	Hopper	.....	Steel	.....	1,550	.....	BB
	2,000	Box	.....	St. Und'frame	.....	1,855	.....	BB
	500	Gondola	.....	St. Und'frame	.....	1,350	.....	BB
	250	Ballast	.....	Steel	.....	1,775	.....	BB
	200	Caboose	.....	.....	.....	2,175	.....	BB
Southern Pacific	232	Automobile	100,000	Steel	T. C. I. & R. R.	2,896	April	K
	409	Flat	100,000	St. Und'frame	Company Shops	1,657	May	K
	175	Tank	100,000	Steel	Gen. Amer. Tank	2,305	April	K
	50	Caboose	60,000	St. Und'frame	Company Shops	2,852	May	K
	15	Caboose	60,000	St. Und'frame	Company Shops	2,801	June	K
Texas & Pacific	500	Gondola	100,000	Steel	Pressed Steel	1,826	January	A
	300	Flat	100,000	Steel	Am. Car & Fdy.	1,623	January	A
	200	Automobile	100,000	St. Und'frame	Am. Car & Fdy.	2,724	January	A
	10	Caboose	100,000	St. Und'frame	Am. Car & Fdy.	3,010	January	A

Passenger Car Prices in 1928

(See explanatory note in text)

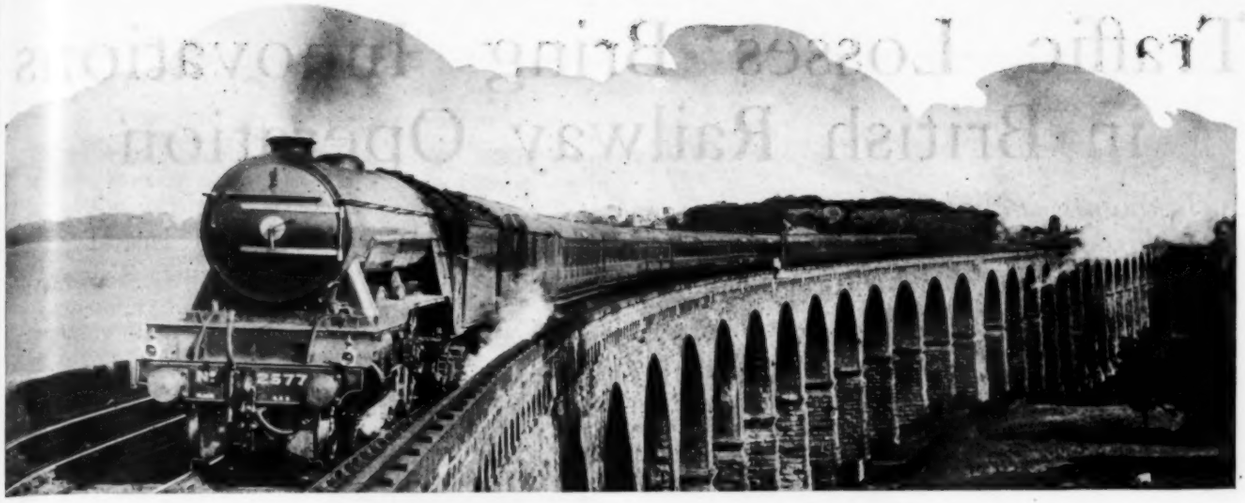
Road	No.	Class	Length	Weight	Builder	Unit price	Date of order	Equipment trust series
Chicago & North Western	23	Sub. Coaches	70 0	99,600	.....	$23,386	Oct., 1927	T
	20	Sub. Pass.& Bagg.	70 0	99,300	.....	23,135	Oct., 1927	T
Erie	25	Sub. Coaches	66 0	101,500	Standard Steel	18,766	May	..
	4	Bagg.-Mail	70 0	140,000	Pullman	26,047	May	..
	5	Bagg.-Exp.	70 0	127,500	Pullman	21,032	May	..
	2	Dining	80 0	169,100	Pullman	42,600	September	..
Mobile & Ohio	3	Coaches	.. ..	.....	Bethlehem Steel	25,100	Oct., 1927	Q
	3	Coaches (with partition)	.. ..	.....	Bethlehem Steel	25,450	Oct., 1927	Q
	1	Mail-Bagg.	64 5	117,500	Bethlehem Steel	19,000	January	Q
Southern	16	Mail-Bagg.	.. ..	.....	Bethlehem Steel	18,850	Dec., 1927	BB
	7	Mail-Bagg.	.. ..	.....	Bethlehem Steel	18,000	Dec., 1927	BB
	2	Mail	.. ..	.....	Bethlehem Steel	21,800	Dec., 1927	BB
St. Louis-San Francisco	15	Bagg.-Mail	70 0	136,500	Am. Car & Fdy.	21,704	February	CC
	5	Baggage	70 0	131,100	Am. Car & Fry.	18,272	February	CC
Southern Pacific	6	Bagg.-Postal	73 6⅛	124,220	.....	25,956	.....	..
	6	Bagg.-Post.	73 0	132,000	.....	25,826	.....	..
	10	Baggage	73 6⅛	124,220	Standard Steel	21,252	May	K
	15	Pass. Coach	82 2⅞	150,000	Am. Car & Fdy.	30,537	May	K
	10	Pass. Coach	82 3	141,000	Am. Car & Fdy.	30,479	May	K
Southern Pacific	5	Pass. Coaches 3 comp.	81 3	143,000	Pullman	32,236	May	K
	6	Dining	80 5½	160,500	Pullman	50,976	May	K
Texas & Pacific	3	Dining	80 10	169,100	Am. Car & Fdy.	46,000	January	A
	5	Bagg.-Exp.	72 3	130,000	Am. Car & Fdy.	20,191	January	A

There will be cases of locomotivess of the same type and of approximately the same weight that will vary widely in price. In most of such instances the variation will be explained by a difference in tractive force which will be apparent in the tabulations. This greater tractive force without increase in weight may be brought about by greater refinement of design or the addition of certain specialties not put on the less costly locomotive. Variations in price also result from the addition of boosters, stokers, water tube fireboxes, higher boiler pressures, etc. The possibility of variations in price due to engineering and development costs will also be appreciated.

Similar qualifications will apply in the case of freight cars. There will be instances, especially, where cars having different prices will be found to vary primarily because the more expensive car is of stronger construction.

It will, of course, be recognized that prices at one time of the year may be different from those in another part of the year, and that frequently the prices on larger orders are better than those on smaller ones.

A BILL TO COMPEL the electrification of all railroads operating in St. Louis by January 1, 1930, was presented to the St. Louis Board of Aldermen on December 14, by Alderman Samuel L. Wimer. The penalty for violation of the proposed ordinance would be from $100 to $500 for each offense, each day's violation a separate offense.



FOREIGN SECTION

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French Railways Balance Budget

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Traffic Losses Bring Innovations in British Railway Operation

Developments include special fares, third-class sleeping cars, low rates for tourists' automobiles and plans for highway services

By W. H. Fraser, M. Inst. T.
Publicity Agent, Great Western Railway

Co-ordinated Container Service on the Great Western

BESET by the difficulties of falling revenues, lower dividends, highway competition and a complete change in railway rates British railways have gradually pressed forward, until they have to their advantage Parliamentary authority to operate on the highways (which authority was secured in the teeth of formidable opposition), a voluntary reduction of wages on the part of the employees to help in the restoration of the financial position, and numerous innovations in rail practice which are gradually restoring public confidence in the railways.

New Rate Schedules

January 1, 1928, was the date, called by law the "appointed day," which the Railway Rates Tribunal designated for bringing into operation the new schedules of rates. On that day the whole system of railway rates which had operated for so many years underwent a revolution and one of the most important changes effected by the Railways Act of 1921 was accomplished. The task set the tribunal under the act was a difficult one and its inquiry lasted upwards of five years. The financial interests involved were so great as to constitute this inquiry one of the most important ever held. The sum fixed by the tribunal as the gross annual revenue of the four railway groups is £196,632,901 and the standard (net) revenue £50,057,847.

Apart from the amalgamations the standard revenue provisions are the central feature of the Railways Act and dominate the whole future of railway rates. For the first time in history legislative recognition is given to the principle that the capital invested in British railways is entitled to a return. The Act also confers considerable benefits on the public and has been called the "Traders Charter" (i.e., shippers' and receivers' charter) as never before in the history of railways has Parliament given traders (shippers and receivers) such rights and privileges. Formerly the railway companies were entitled to keep all the profit they could make but in future, under the Act, out of every £100 excess profits earned by the railways £80 is to go to the public in the shape of reduced rates and fares.

Big Decline in Revenues

The continued depression in basic industries is reflected in a heavy decline in railway traffic, particularly of coal, iron and similar commodities, while the intensity of road motor competition is responsible for serious decreases in passenger revenue. Consequently with only two months of the year to go the companies were not within sight of their standard revenue as fixed by the Railway Rates Tribunal. For the first 44 weeks of the year revenues of the four groups fell by nearly 8 million sterling, or about 5 per cent, as compared with the corresponding period of 1927. These figures are shown in Table 1.

The present position of British railways is due to three main causes: Stagnation of industry, wage burdens imposed by the government, and motor transport competition. Road transport is of purely secondary importance compared with the great slump in freight traffic conse-

quent upon the stagnation of industry, a matter beyond the control of the railways.

The Railway Wage Agreement

Faced with a decline in revenue at the rate of about 9 million sterling per annum the railway companies, in view of the fact that labor costs form the largest item in their budget, decided to seek the co-operation of employees in their endeavor to overcome what it is hoped will prove only a temporary difficulty. An approach was made to the railway trade unions and the whole matter thoroughly discussed with the result that a reduction of

Table 1—Comparative Statement of Passenger and Freight Train Traffic Receipts—1927 and 1928
44 Weeks ended November 3, 1928

Railway Company	Passenger Receipts Decrease compared with 1927	Freight Receipts Decrease compared with 1927	Total Decrease compared with 1927
Great Western	£190,000	£1,010,000	£1,200,000
L. M. S.	525,000	3,252,000	3,777,000
L. N. E.	578,000	1,767,000	2,345,000
Southern	77,000	541,000	618,000
Totals	1,370,000	6,570,000	7,940,000

2½ per cent in the standard rates of pay for all classes of railwaymen until times are better was agreed to. This was less than the companies asked, but it will be of material assistance since it enables the railways to reduce their annual wage bill by something like 3 million sterling. An interesting feature of the arrangement is that everyone from directors to lamp boys share in the reductions.

This agreement is highly significant because it is a convincing demonstration of the reality of the new spirit of co-operation in industry which has shown itself in recent months. Regarded from the strictly economic standpoint of railway finance it indicates a growing realization of identity of interest between the men and the service with which they are associated. Following the conferences which had previously been held between representatives of the management and the men for the purpose of improving the general position of the railways it shows a genuine desire on the part of the staff to help in the restoration of their means of livelihood to its former prosperity.

Reduced Dividends

It was unlikely that dividends would be maintained this year at the 1927 rates and the announcement of the interim distributions confirm this expectation. The comparative statement of dividends, paid on ordinary stock in 1927 and 1928 follows:

Railway	1927 Interim per cent	1927 Final per cent	1927 Total per cent	1928 Interim
Great Western	2¾	4¼	7	1½
L. M & S.	2	2¾	4¾	1¼
L. & N. E. Preferred	—	⅜	⅜	Nil
L. & N. E. Deferred	Nil	Nil	Nil	
Southern Preferred	2½	2½	5	2½
Southern Deferred	—	2	2	—

Steam Rail Car on the London & North Eastern

Coaling Plant on the London, Midland & Scottish

The London & North Eastern, which paid ⅜ per cent on its preferred ordinary stock in 1927, has again postponed consideration of the distribution on that stock until the end of the year. The Southern, which has paid as usual a 2½ per cent interim on the preferred ordinary stock only, declares its dividend on the deferred ordinary stock in February. Many economies have been made and the reductions in expenditure and improvements in net results of ancillary businesses are estimated to represent substantial savings on all the railways. Table 2 shows changes in prices of railway stock as compared with last year.

Add 8 Cents to Gasoline Tax to Help Railways

The Budget of 1928 introduced in the House of Commons by the Chancellor of the Exchequer in April contained a comprehensive scheme of administrative reform. Under this plan productive industries, including railways, will be relieved of three-fourths of their local taxation. In order to finance this relief in local taxes an additional tax of 4d. (8 cents) per gallon on gasoline was imposed. The tax relief to the railways is conditioned

Table 2—Prices of Ordinary Stock—1927 and 1928

Railway and name of Stock	Highest prices, 1927	Price on Nov., 1928
G. W. Consolidated Ordinary	97⅛	83½
L. M. & S. Ordinary	79½	52
L. & N. E. Preferred Ordinary	56¾	24
L. & N. E. Deferred Ordinary	22¾	11½
Southern Preferred Ordinary	82½	74
Southern Deferred Ordinary	45¼	32

by the obligation to apply the whole of the relief to a reduction of freight rates for the coal, iron and agricultural industries. As, however, the tax relief was not to operate until October, 1929, and the needs of the heavy industries are urgent it was subsequently agreed by the government that the relief to the railways should be hastened by several months in order that freight rates for the industries named could be reduced without delay.

Beginning on December 1, a sum at the rate of 4 million sterling per annum was allowed to the railways in

respect of their tax relief and from that date reduced rates were in operation on coal for export and blast furnaces, on iron ore, on limestone and other raw materials of steel making and agricultural manures and feeding stuffs. Reductions of from 7½d. to 10½d. per ton on coal and of 10 per cent on agricultural necessities will afford much needed assistance in those industries and, although the railways will not receive anything directly from their tax relief, it is expected that the stimulus to depressed industries will result in considerably increased traffic by which the railways will benefit.

Railways Granted Road Powers

The application of the railway companies to Parliament for an enlargement of their statutory powers sufficient to enable them generally to operate highway services aroused great interest throughout the country. From the outset it was recognized that the principle of the companies' case for more freedom to run services according to public demand and for equality of treatment with their road competitors was unanswerable. The verdict of the joint parliamentary committees and the large majorities in favor of the bills obtained in both Houses of Parliament reflected public opinion on the matter. The powers, however, were not obtained without a great deal of trouble and expense. The opposition of rival interests was long and bitter and the whole fight savored of the historic contests of early railway days.

Co-operation Seen as Benefit to Industry

Looked at generally, the powers granted to the railway companies to operate on the highways and to co-operate with existing road concerns will obviously be to the benefit of industry and the traveling public. The companies will explore the possibilities of their new powers to the full, but the time has not yet arrived for disclosing their plans. Railways have accumulated experience of the transport needs of shippers and receivers and the public generally and have an elaborate organization with expert staffs engaged in supplying those needs. The public will now have the advantage of this organization in the business of highway transport as well as rail transport so that combined railway and road facilities may represent the lowest cost to the country as a whole. Railway interests will, however, be kept in the forefront, the newly acquired road powers being used mainly as auxiliary to railway services.

Rail and Road Service Instituted

The Great Western, which was the pioneer in motor coach operation in Great Britain before any motor coaches appeared on the London streets, is developing its already extensive services, numbering nearly 200, which it has in the west of England and elsewhere. An experimental rail and road service has also recently been instituted between London and Cheltenham where road competition is abnormally keen. By this service a passenger is taken by fast train to Oxford (63 miles) and from Oxford to Cheltenham (40 miles), or vice versa, by the company's motor vehicles, the whole journey occupying about three hours as against over four hours by road throughout. Fares by rail and road have also been reduced to aproximate closely to those offered by independent highway operators.

An interesting feature of this great fight for road powers by the British railways is that they have been assisted wholeheartedly by the railway trade unions, representing some three quarters of a million railwaymen, and that the employees themselves took an active part in the campaign in the press and elsewhere prior to the submission of the bills to Parliament. Another interesting feature is the discussions now proceeding between the railway companies and the highway interests for co-operation and possible amalgamation.

Royal Commission on Transport

The Joint Select Committee of both Houses of Parliament, to which the railways' road bills were referred, reported that it was impressed with the need for amending the chaotic state of the law regarding motor transport and regard this legislation of the utmost urgency, and as a result the government announced a royal commission to conduct a transport inquiry. The Commission consists of twelve members under the chairmanship of the Rt. Hon. Sir Arthur Griffith-Boscawen, an ex-Minister of Agriculture. It is anticipated that the inquiry will last two years so that there is little prospect of Parliamentary action before 1931. The task set the Commission will be one of the most extensive that a body of this kind has ever been required to undertake. Wide terms of reference have been framed which will cover the whole field of transport in Great Britain. The text of the terms of reference is as follows:—

> To take into consideration the problems arising out of the growth of road traffic and, with a view to securing the employment of the available means of transport in Great Britain (including transport by sea coastwise and by ferries) to the greatest public advantage, to consider and report what measures, if any, should be adopted for their better regulation and control, and, so far as is desirable in the public interest, to promote their co-ordinated working and development.

The first meeting of the Commission took place on October 18. Evidence was heard on behalf of the four amalgamated railway groups and other transport interests. The extent to which co-ordination between the available means of transport is practicable and desirable in the public interest and suggestions to bring about such co-ordination, and the disabilities of any particular means of transport which place it in a disadvantageous position in relation to competitors are among the more important subjects to be considered by the Commission.

Recent Railway Enterprise

During the past summer public attention has been aroused by longer and longer non-stop runs to Scotland, rivaling the record held by the Great Western for over 20 years with the longest non-stop run in the world. Commencing with the summer service the London & North Eastern ran the "Flying Scotsman" from London to Edinburgh (392 miles) each day without a stop for any purpose whatsoever. In order to relieve the enginemen on this long run the tenders of the engines were constructed with a corridor through which the engine crew could pass from and to the main train when changing duty on the journey. These long non-stop runs were discontinued with the ending of the summer service.

What has been termed "occasional travel" has this year been encouraged by cheap and half-day excursions to seaside resorts and other centres of interest. The success of these has been phenomenal. Half-day excursions at the rate of three miles a penny (i.e., 2 cents) to places 100 or 200 miles distant are in great demand and several trains for one excursion have frequently been provided in order to accommodate the passengers who wished to travel. The tendency now is to provide dining cars on half-day excursions so that the passenger may take meals both going and returning.

Educational Excursions Popular

Educational excursions, which consist of half-day trips to railway locomotive shops, docks, engineering and other

facilities, or to inspect an Atlantic liner, have been very popular this season and are being continued throughout the winter. On one system nearly 600 half-day excursions were run in a month. Rail-theatre matinee trips have also been introduced, train and theatre seats being guaranteed and meals provided on the train each way. Excursions which include a motor drive and meals or steamer trip on the Thames and excursions including train, hotel and golf, or train and races are becoming increasingly popular and have helped to swell the total of cheap fare passengers carried by railways during the year.

Week-end Ticket Rates Reduced

Week-end tickets, of which over 20 million were issued in 1927, have recently been extended from Friday morning to Tuesday night and the minimum fares considerably reduced. Cheap one-day round-trip tickets at one-way fares to places in the neighborhood of populous centres have been extended, and have in many cases brought railway fares below the bus charges.

A big reduction in the rates for private motor cars which are accompanied by train passengers has resulted in an entirely new traffic being created. People going for vacations for long distances now take their cars with them by rail thus avoiding the time and fatigue of driving them there.

An innovation, which may have far-reaching effects, is the provision for payment of railway fares by installments. The plan provides for the granting of special facilities to depositors of banks which enable them to secure a 5 per cent reduction on railway tickets and is a valuable contribution to the solution of the difficult problem facing people of small means of saving sufficient money for the annual or other vacations. This plan suggests the American "Save to Travel" idea.

Third-Class Sleepers

In order to meet a desire for third-class sleeping accommodation three of the four railway groups with long distance night services have introduced third-class sleeping accommodation on certain trains. The cars consist of ordinary third-class corridor coaches with seven compartments, each compartment having hinged backs on either side so as to form upper berths. Each compartment is on the "couchette" system and provides four berths for "lying down" accommodation. Pillows and rugs are provided and the extra charge per berth is 6 shillings in England and Wales and 7 shillings to Scotland, while the coaches are capable of use for ordinary travel in the day time as well as for "sleepers" at night.

Steam Rail Cars

The work of speeding up local and branch line trains is in process of accomplishment in many parts of Great Britain. The steam-propelled rail motor car accommodating about 60 persons has been found economical to operate and easy to manipulate in a shuttle service between two points. It is by no means a new departure, as similar cars have been in the use in some parts of the country for many years, but the growth of road competition has brought them into greater prominence and a large number both of the Sentinel-Cammell and Clayton types have been placed on order by the companies.

Freight Traffic Developments

The importance of giving a greater certitude to the collection and delivery of merchandise by express freight trains has for some time past occupied the close attention of the companies. Freight trains between all big centres are run by the various railways with the object of maintaining a next day delivery at places as far from London as Liverpool, Manchester, Penzance, Glasgow and Aberdeen. One company has 70 of these express freight trains running nightly and the need has arisen for some kind of public timetable for these numerous trains. Hitherto no timetable of freight trains has been issued by the companies but, in response to a demand from merchants, modified timetables or lists of express freight trains have now been furnished giving the times of departure each night and approximate times of arrival the following morning.

The diversion of high grade traffic to the road continues to cause concern to the railway companies. Of the Lancashire cotton traffic, for example, which formerly moved entirely by rail and amounted to about a million tons annually more than 80 per cent had been diverted to the highway. Early last year application was made to the Railway Rates Tribunal by the companies for permission to quote lower rates for cotton and certain other commodities, by means of which a great deal of the traffic was recovered to the rail.

Containers and Rail-Head Distribution

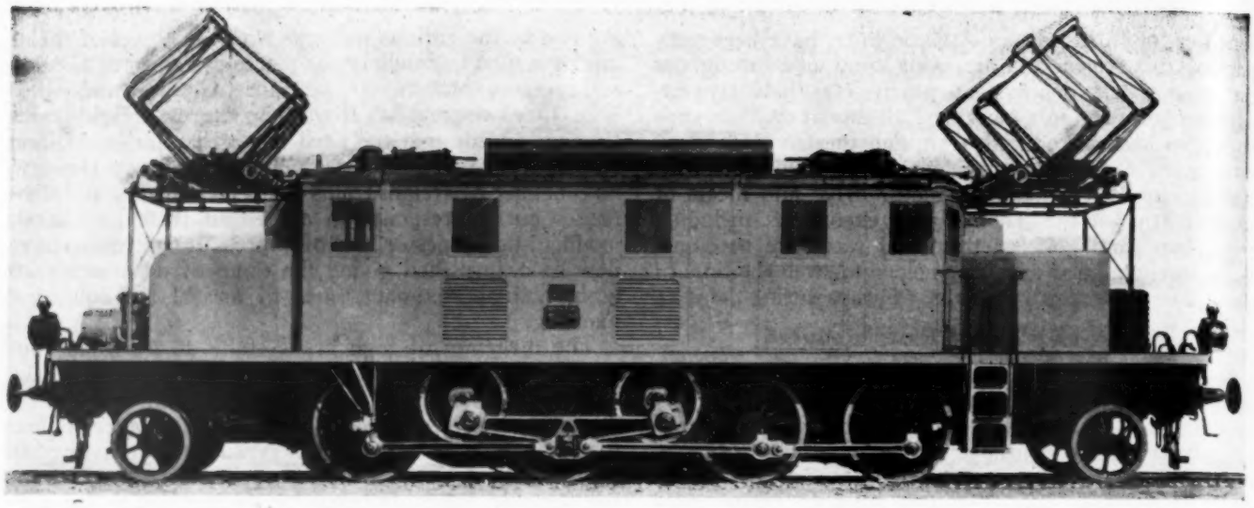
A considerable extension of the container method of transporting freight has been made during the past year and all kinds of traffic is now so conveyed. It is a commercial facility of great value to traders while at the same time enabling the railway companies to meet certain forms of highway competition at least on equal terms.

Railhead stations are now established in many parts of the country from which freight is distributed by railway motor vehicles throughout a whole district. What may be termed special contract services are in existence at some stations where trucks are exclusively allocated to the use of a wholesale manufacturer. To comply with the trader's desire for publicity the railways sink their identity entirely, the trucks being painted with the name of the firm and the driver also wears the firm's uniform. Coupled with railhead schemes of all types the railways provide warehouse accommodation at the centers selected which enable manufacturers to supply their customers from local railway warehouse stocks at short notice.

An extension of the post office "cash on delivery" system to consignments carried by railway was made this year and now includes goods to the value of £40 of any weight and size for delivery by rail in England, Scotland and Ireland.

Electrification

The report of the Railway Electrification Committee appointed by the Minister of Transport, under the chairmanship of Sir John Pringle, chief inspecting officer of railways, was issued in November. During the past seven years to March 28, last, 445 miles of single track railway were electrified on the direct current system, of which 408 miles were on the Southern Railway. By March 31, 1929, there will be 1,500 miles of single track electrified. Of these, following the change over on the Central Section of the Southern from the overhead to the third rail system, only 19 miles will be alternating current. The committee recommends that direct current should be used on all further electrification or extensions of existing electrification. It also states in its report that it is the desire of the Minister of Transport that railway electrification plans should not be unduly hampered or rendered economically impracticable by regulations of too stringent a character.



Three-Phase Electric Locomotive on the Italian State Railways

Italian Roads Encounter Expensive Operation and Light Traffic

Construction costly while few of the national products bring profitable traffic to the railways—Lack of coal stimulates electrification

By D. F. Spencer

Assistant United States Trade Commisioner, Rome, Italy

THERE are in Italy 13,235 miles of railway of which 23 per cent are operated by private companies enjoying concessions from the government. The major part of the railways, comprising 10,000 miles of line, is operated by the state through a bureau called the Administration of State Railways.

Of the 70 private railway companies, four operate 1,342 miles of line. The remaining 66 companies control the balance of 1,688 miles. Naturally these are of little importance, since they are in many cases only spurs that have been constructed to tap particularly isolated but productive regions. We must therefore think primarily of the State Railways of Italy in order to get a fair conception of the Italian railway system.

The boot-shaped Italian peninsula, the central part of which is paralleled in its length from north to south by a high mountain range, renders railroad construction particularly difficult and railway operation unusually expensive. The construction of lines running from east to west across the peninsula involves tunnels, steep grades, high bridges and trestles, as well as numerous cuts and fills. It is only in the low country of the Po valley that railways can be constructed and operated under normal conditions.

Before going further into the construction of railways in Italy it is well to study briefly the productivity of the counry to be served. Italy is not a rich country by any standard. Despite the overcrowded population the nation remains first and last agricultural. The principal crops are grapes, wine, wheat, maize, olives, oats and minor farm products.

There are no coal mines; no iron ore deposits; in fact very few minerals of any type capable of developing a large industry are to be found. Fruits are grown in the southern part of the peninsula and in the adjacent islands of Sicily and Sardinia. The principal olive oil center is Bari on the Adriatic. Because of the nature of the products of the country there is no great surplus of a single commodity in one locality that may be depended upon to yield freight revenues from its transportation elsewhere.

Because of its remoteness from the mainland, the highly productive island of Sicily markets its huge fruit and grain crops by water. True, the straits of Messina are crossed by a ferry system which serves the railways but after getting from the island to the mainland there is a long difficult haul of 285 miles to the nearest large consuming market, which is Naples. The loss of this freight to the Italian lines is as great in proportion as would be the loss of the rich California crops to the western lines in the United States.

Lack of Coal Leads to Electrification

The total production of carbonaceous combustibles in Italy is little more than one million tons a year. Most of this domestic fuel is of such low grade that it is used for industrial purposes. Therefore, Italy is faced with the necessity of importing annually more than fourteen million tons of coal. Of this total importation about three million tons per year have been received from Germany as war reparations during the last few years. These payments in kind cease in 1930, however, and Italy must again enter the market as a buyer of coal for her railways.

Looking forward to this day, the Italian Government, in 1920, formulated and began hydro-electric develop-

ments which when completed will cost 700,000,000 lire, or a sum equivalent to about $35,000,000. Work has gone steadily forward on these undertakings until there remains at present only $13,300,000 of the original fund to be expended.

It was, however, in 1901 that the electrification of Italian railways actually began. Little was done in the ensuing ten years, after which time renewed activity set in again and has continued until the present. The greatest development has been since the advent of the Fascist regime. The result is that now, five years after the institution of Fascism, Italy not only produces as much electric power as would be obtained through burning eight million tons of coal, but she has acquired also an important position in the world with regard to the electrification of railways and has more miles of electrified railway lines than any other country in Europe.

Since 1924 the following lines have been electrified:

Line	Length in Kilometers Double Track	Single Track	Total
Port of Genoa		22.3	22.3
Genoa (port)-Leghorn	153.5	40	193.5
Naples-Pozzuoli	14.5	...	14.5
Bologna-Florence	38.8	93	131.8
Foggio-Benevento	8.6	92.8	101.4
Rome-Sulmona		171.8	171.8
Lines Being Electrified			
Pozzuoli-Villa Literno	21		21
Sampierdarena-Ovada-Alessandria	9.4	64.3	73.7
Bolzano-Brennero	89.3		89.3

Including the lines electrified prior to 1924 there exist today on the Italian State Railway the following:

	Miles
Length of electrified trunk lines	658
Length of tracks electrified (including tracks in yards)	1422
Power lines (monophase)	411
Power lines, trunk lines, triphase	1286
Number of electric locomotives in use—580.	

The above figures do not include 608 miles of railway which have been electrified on the lines operated by private companies. A grand total therefore, of electrified railway lines is 2688 miles.

Electrification Brings Operating Economies

It must not be presumed that such a large scale of railway electrification has been developed with an idea to more economic operation, although in some cases this has been the result. When we consider that the value of coal imports is more than 140 million dollars annually and that this huge sum has its weight in affecting the unfavorable trade balance, we can see the point of the argument that Italy will profit more by stabilizing her currency than perhaps by fuel economy on railway operation. The value of coal imports may be better visualized when we recall that only imports of grain exceed the value of coal imports.

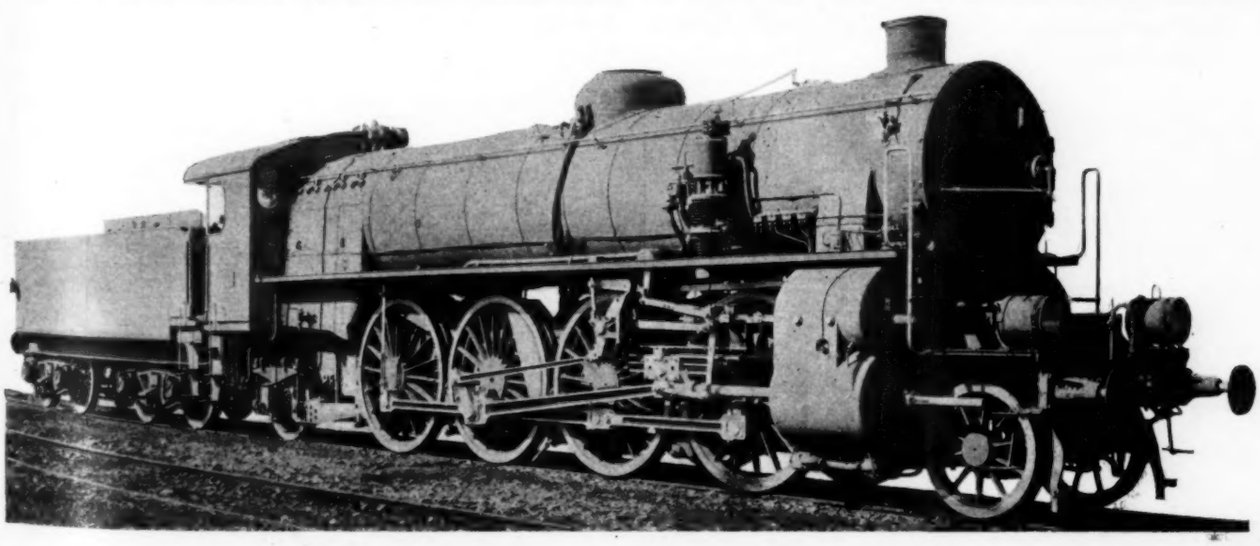
Construction of Direct Lines

In 1908 the Italian Parliament voted funds and authority for the construction of three direct lines to cut down distance and time between centers of population. Of these lines only one is actually in operation because of interruption during the war. This line, from Rome to Naples, virtually follows the coast from Rome to the southern metropolis and cuts 35 kilometers from the distance and two hours from the time of the fastest passenger trains on the former line, which is still operated for both passenger and freight service. The Florence-Bologna direct line is now almost completed, while the Genoa-Milan direct line, which was started after the war, is entirely completed. The last named road, had it been completed before the war, would have saved much valuable time and perhaps countless lives, since operation of traffic over the then existing line was extremely difficult, due to continuous congestion.

Ventilated Refrigerator for Italo-English Service via Channel Ferry

Motor Coach Competition

It is doubtful whether competition in passenger business and short freight hauls from motor coach lines will ever in Italy assume the importance that it has in other countries, particularly England and the United States. The railways are subsidized by the government and naturally enjoy certain exemptions while motor coach companies seem to be the target for taxation of all kinds, chief of which is a tax of $6 per 220 lb. of gasoline and



Four-cylinder, Superheated Locomotive of the Italian State Railways

$2.75 on every 220 lb. of oil. On all accessories there is a tax of 1 per cent of the amount of the invoice. There are nineteen other direct taxes on motor coach companies and equipment in addition to the three listed above.

The typical four-wheel European freight cars of "40 men, 8 horses" variety are in use on the Italian lines. Merchandise is shipped by fast freight or slow freight according to the desire of the shipper. The relative difference in rates is about double or more for fast freight. There is a delay at the large city terminals since merchandise even of domestic origin is subjected to a city customs tax which as a rule is fairly light, but the machinery of customs imposition is there nevertheless.

Features of Passenger Service

To an American accustomed to the luxurious comfort of our best trains, the second-class passenger accommodations offered in Italy are a disappointment. The omnipresent dirt and soot as well as the primitive toilet arrangements are revolting. Sleeping cars are owned and operated by the International Sleeping Car Company. Tariffs on these cars are very expensive, being for second-class passengers on an overnight haul, as from Rome to Milan, (12 hours) $6.25 plus an obligatory tip of ten per cent of the sleeping car charge. Trains run on time, however, while all passenger trains are adequately attended by members of the national police. Pilferage of baggage and freight has been practically stamped out.

General Equipment

On July 1, (the latest period for available data) the following rolling stock was operated by the Italian State Railways:

Steam locomotives	6,313
Electric locomotives	580
Freight cars	151,382
Passenger cars	8,964
Special cars	778

There were 70 steam locomotives on order to be delivered between July 1, 1927, and June 30, 1928. All existing equipment is believed to be in fairly good condition at present. There is a sad lack of refrigerator cars on the Italian lines. Efforts are being made in certain quarters to secure construction of additional equipment of this type in order to more economically handle the fruit crops and to encourage the sale of frozen meat and thereby reduce the cost of marketing beef cattle.

Total assets of the Italian State Railways are carried on the books of the administration at $1,106,000,000 of which the principal items are:

	Valuation
Tracks	$500,000,000
Rolling stock and motive power	265,500,000
Stores	47,340,000
Houses for employees	6,158,000
Pension fund, legacies, advances and other aids to employees	94,602,000
Cash on hand and accounts receivable	172,000,000

The gross revenues of the State Railways in 1926 were $201,000,000 and operating expenses were $186,726,000, leaving net operating revenues of $14,274,000. In 1927 gross totaled $203,693,400, while expenses rose to $197,464,000, leaving an operating net of $6,229,000. The conclusion drawn from the earnings when compared with the investment shown on the balance sheet is that the Italian government receives a very low return on its investment in railways. However, this conclusion must be tempered with other considerations.

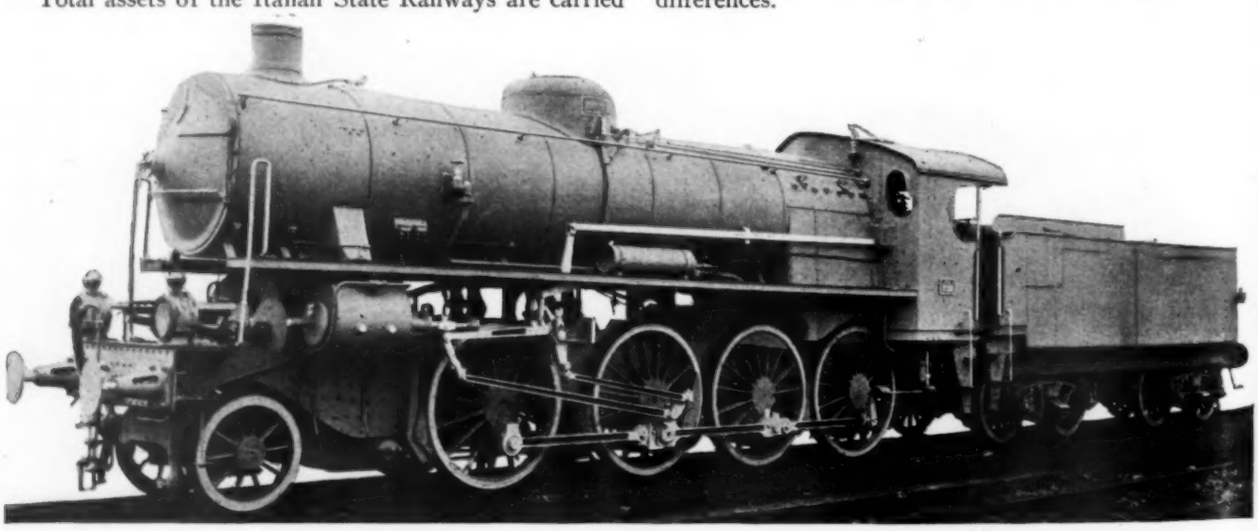
While undoubtedly there do exist a number of weaknesses the fact remains that numerous services rendered the government and which do not show in the earnings have to be reckoned with. The cost of transporting soldiers, government supplies, a reduction of 35 per cent on the fares of state employees might be placed on the credit side of the ledger and make the showing considerably better.

Traffic Volume

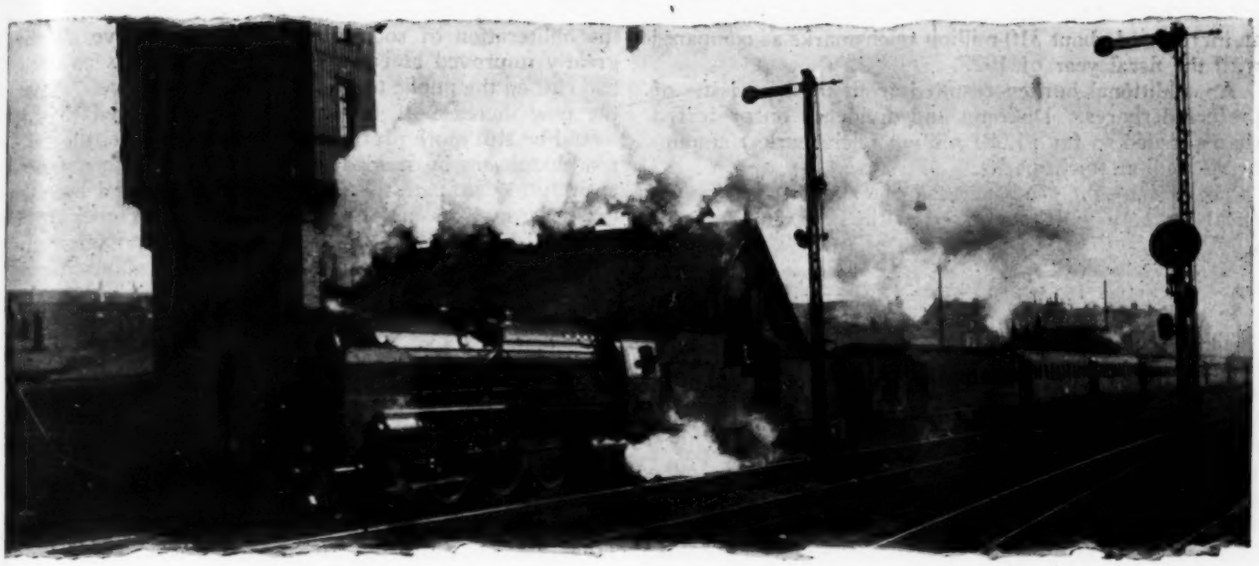
In 1926 there were sold 117,600,000 passenger tickets. The passenger train mileage was 5,500,000, freight handled amounted to 64,900,000 metric tons while the ton mileage was 8,240,000,000.

Occasional mild criticism of the rates in vogue on the Italian railways may be seen in the press but more particularly the high cost of operation in comparison with the cost of operation on the private lines. It must be remembered that the government railways occupy a relation to the government similar to that held by the United States Post Office Department. Therefore, to draw comparison with the low earnings or rather the lack of earnings of the Italian roads and the earnings of the American roads is obviously unfair to the Italians.

Italian railways never suffer from labor strikes. There is a law against concerted action of employees against the employer. The employees of the Italian roads are represented by certain members of their body while the administration is represented by men who express its will. In cases of disagreement between workmen and administration these two groups convene to adjust their differences.



Two-Cylinder, Superheated Locomotive of the Italian State Railways



An Express Train on the German State Railways

German Lines Reparation Payments Reached Maximum in 1928

Increased rates, as well as operating economies, rendered necessary to meet augmented indemnities and other rising costs

By Reichsbahnrat Dr. Genest
Archiv für Eisenbahnwesen, Berlin

THE calendar year 1928 comprises the last two-thirds of the fourth, and the first third of the fifth reparation year. It was marked by enormously increased burdens on the government railways in various fields and a general increase in rates rendered necessary thereby.

Reparation Payments

Since, according to the Dawes Plan, the "transition period" (of annually increasing charges) ended with the third reparations year, the government railways had for the first time to raise the full reparation payment in the fiscal year ended August 31, 1928. The sums in question were as follows:

(a) 660 million goldmarks—Interest and redemption on 11 billion goldmarks of reparation bonds.
(b) 35 million goldmarks—Preferred dividends on the preferred shares of 500 million goldmarks placed at the disposal of the government according to the Dawes plan agreement.
(c) 290 million goldmarks—To be paid as a transport tax to the general agent for the reparation payments.
A total of 985 million goldmarks, or the equivalent of $236,400,000.

Even though the transport tax is a charge which is shifted to railway patrons, it constitutes an additional load on traffic, and thus prevents the railways from adjusting their rates in such a manner as would be to the best advantage of the corporation.

To the above named sum must be added a contingent reserve fund which, according to regulation, is to be paid annually to the amount of two per cent of the entire operating income until the sum of 500 million goldmarks ($120,000,000) has been accumulated. This reserve fund, which so far has yielded about 100 million goldmarks annually; is also obligated for reparation purposes, and is therefore not at the free disposal of the corporation. This latter amount is not included in the above total of 985 million goldmarks.

The enormous burdens of the fiscal year 1928 represent a considerable increase compared with the first three years, in which the payments made to the reparation agents (including transport tax, but not including the reserve fund) were as follows:

1925	499.4 million reichsmarks
1926	833.3 million reichsmarks
1927	915.5 million reichsmarks

Increased Wages

Besides the increase in the reparation burdens, the growing wage burden has been of special importance. In connection with the new regulation of the salary system for government employees, a salary schedule for the railway salaried staff was introduced on October 1, 1927 to meet an urgently needed increase. The increase in salaries of the active staff was accompanied by an increase in pensions and similar payments which the corporation was obliged to bear after the reorganization. After lengthy negotiations employees' wages and bonus payments were also increased early in 1928, so as to be brought more nearly in line with the level of general wages. Finally, expenses in connection with employees' welfare work, based on legal regulations, were much increased.

The total personnel expenditures for 1928, including wages for maintenance and shop employees, amount to 2913 million reichsmarks ($699,120,000), and represent

an increase of about 310 million reichsmarks as compared with the fiscal year of 1927.

An additional burden resulted from the new issue of preferred shares. Discount and dividends on preferred shares issued so far (1,081 million reichsmarks) amount to 90 million reichsmarks.

To sum up, the total increase of expenditures for the fiscal year 1928 as compared with 1927 amounts to:

Wages	310 million reichsmarks
Increase in reparation payments	70 million reichsmarks
Discount and dividends	90 million reichsmarks
	470 million reichsmarks ($112,800,000)

This increased expense, and a consequent shortage of working capital, left insufficient funds for remedying unfavorable conditions which still exist as a result of the war, especially in connection with the repair of roadbed and bridges. Maintenance costs were increased since there were no funds for replacement and projects for increasing safety had to be given up. The great economy necessitated through circumstances endangered operation in many places. It was evident that this increase in expense could not be met, in spite of favorable revenues, without an unwarranted restriction of maintenance and replacement.

Rate Increases

If the railways were to remain sound, an increase in rates was unavoidable. In May, 1928, therefore, the management requested the government to increase rates at least 250 million reichsmarks ($60,000,000), annually, and to distribute this increase on freight and passenger business on the ratio of four to one. When the government refused this request with the suggestion that the matter be referred to the railway tribunal, the management put the above mentioned request to this court. The railway tribunal pronounced the following decision on August 24, 1928:

"The German Government Railroad Corporation is authorized, at a desirably near date to be decided by the Minister of Transport, to raise freight and passenger rates in a ratio of about four to one to such a degree that the increased annual income shall amount to 250 million reichsmarks."

The increased freight rates became effective on October 1, the general increase being 11 per cent. A few competitive tariffs and special freight classes requiring relief were excluded from the increase, so that the average increase is about six per cent.

Fourth-Class Passenger Service Discontinued

The increase in passenger fares came into force with the introduction of the winter timetable on October 7. It was connected with a regulation of decisive importance for the passenger service—the elimination of the fourth-class. The reduced circumstances of the middle classes, the obliteration of social differences, and above all the greatly improved and comfortable fourth-class coaches, had caused the public to prefer it more and more. After the new increase of fares it was to be feared that it would be still more preferred. Because of this, the railroad management decided, under force of circumstances, entirely to eliminate the fourth-class, which had been in existence in Prussia for 72 years. Since October 7 the railroads carry only one "wooden class" and one "upholstered class". Only on express trains of international importance has the first-class been retained.

The new rate per mile in the wooden class is the equivalent of 1.42 cents (compared with the former fourth-class rate of 1.27 cents and 1.92 cents for the third-class). The new rate for the upholstered class is 2.24 cents (compared with 2.88 cents for the former second-class. "Luxury" class carries a rate of 4.30 cents, compared with 4.14 cents for the former first-class.

The surcharges for one class of express trains ("D trains") have been increased, while new surcharges for other express trains have been established. Workmen's and school children's tickets are exempt from the increase. The new adjustment, not including the surcharges, results as follows: First-class rates are raised an average of 10 per cent; second and third-class rates are reduced about 25 per cent; and the new third-class is about 12 per cent higher than the former fourth-class.

The effects of the increased rates must be awaited before permitting a final conclusion as to their efficacy. An increased use of second-class accommodations is already noticeable.

The "Rheingold" Train on the German State Railways

Accident Investigation

While the railroads had no considerable accidents in 1927, unfortunately a number of serious accidents took place in 1928 and caused a great sensation among the public. The catastrophes of Siegelsdorf, Munich, and Dinkelscherben followed each other within a short time and cost the lives and the health of a great number of persons, This accumulation of grave accidents resulted in the forming of a committee to investigate the safety of transportation on the German railways. This committee was composed of railway experts, members of the Reichstag, and representatives of the railway unions. The committee finished its work in September with a report in which are given a number of suggestions toward the elimination of imperfections noticed in several places.

The report comes to the following conclusion: "According to the investigations of the committee, the safety of transportation on the German railways seems as secure as can be expected in all fairness on the part of any public transportation enterprise."

Otherwise the fiscal year of 1928 passed in a quiet and satisfactory way for the railways. The status of the personnel was approximately equivalent to that of 1927.

During August of this year there were 622,805 regular employees and 66,275 part time and substitute workers, making a total of 729,080. There were no labor disturbances.

Dwellings for Railway Employees

The shortage of dwellings existing since the conclusion of the war compelled the railway corporation (just as it did the government, and large firms and banks) to undertake the building of dwellings for its officers and employees. This has resulted in the establishment in recent years of whole colonies of railway employees. It has been the endeavor of the administration to furnish its employees with healthy and attractive dwellings and to avoid the tenement type, in spite of the limited means at its disposal. The number of houses built by the railroad management itself from 1920 to 1927 is 28,404; in cooperation with the building corporations 30,662 houses were erected, thus making a total of 59,066.

Operating Results

Operating results have been favorable. The considerable reduction of employment in the western iron industry during the latter part of the year will undoubtedly result in a large reduction in traffic, unless the disputes can be settled promptly. The supply of rolling stock even during the periods of maximum demands has been efficiently distributed so as to meet the requirements of patrons. Construction has not been great, due to the shortage of funds. Maintenance and replacements had to be limited to the most necessary items. Three thousand-one hundred kilometers of roadbed were rebuilt, thus covering the annual budget requirement of four per cent of the total of the main trackage of 77,000 kilometers. In this work rails of 30 meters' length were used for the first time on lines carrying important trains.

The financial situation of the corporation did not permit to a satisfactory extent the needed strengthening of the bridges to care for the steady increase in train loads. It was possible to strengthen and rebuild only those structures which under present trainloads were materially overstrained or showed serious defects. Silicon steel as used in the larger structures with technical and economic success will probably be replaced with a new

Dwellings Provided for Railway Workers in Berlin District

structural steel which is equivalent to silicon steel in strength but is more economically produced.

Electrification

There has been a further increase in electric operation. It may be stated that electric operation has definitely proved equal in reliability and safety to good steam operation. The trackage electrified totals about 1,550

Interior View of Second Class Parlor-Dining Car on "Rheingold" Train

kilometers, of which 230 kilometers are a part of the Berlin city loop and suburban lines. Of the latter lines 74 kilometers (the northern part) have been electrically operated since 1925. The change of the remaining 156 kilometers was begun in the summer of 1926 and the first electric trains were operated over these sections in June, 1928. At present the operation is partly electric and partly steam, because of the fact that so far an insufficient number of electrically equipped cars has been delivered to care for the total traffic. Complete electric operation will require 1,113 cars, about one-half motor equipped and one-half trailers, and of the total only about 450 cars have been delivered. It is expected that by April, 1929, sufficient rolling stock will be on hand to permit complete electric operation.

The administration expects that the acceleration of service obtained through electrification will result in increased traffic on the Berlin lines and that on the other hand the change will result in a considerable decrease in operating costs.

In equipping the Berlin city lines a large number of automatic substations have been installed to reduce personnel and expense—these being the initial installations of such equipment. These substations will be remotely controlled from four points.

Locomotive Development

In the building of locomotives the past year has been one of consolidating and extending previously made advances. Among the types of standard locomotives previously developed there were built, in particular, a large number of type 1-C-1, branch line tank locomotives with 15 tons per axle, and also type 2-C-1, express train locomotives. Of the newly developed locomotives particular interest attaches to the type E special. This locomotive, intended for switching operations in difficult port connecting service with sharp curves and considerable grades, was developed with gear-driven end axles.

The type 1-C-1 tender-locomotive must be considered the most economical locomotive produced so far. Its effective total efficiency is over nine per cent within a range of from 600 to 800 drawbar horse power, and a speed of 60 kilometers per hour. The express train locomotive series 0-1 are today handling a considerable part of the total express train service and have proven eminently satisfactory. Particularly remarkable is the average coal consumption of 10.6 tons per 1000 locomotive kilometers, which in view of a train weight of 500 tons must be considered highly favorable.

The freight train locomotives equipped to burn pulverized coal give high promise for a reduction in operating costs, particularly in the middle German lignite territory, in which alone they have so far been operated. After thorough preliminary tests, during which they met all requirements, they have been placed in operation. Two of these locomotives have the "AEG" firing system and two others have the "Studiengesellschaft" firing system. Additional locomotives equipped to burn pulverized coal are under construction.

Special Braking Locomotive for Tests

Important progress has been made during the past year in experimental work connected with locomotives. A stationary locomotive testing plant which can handle the heaviest types has been built, and there has been a change in the method of carrying out road tests. It has been the general practice in road tests to use a train as load for the locomotive. The German Railway Corporation has departed more and more from this method, and today both freight and express trains locomotives are loaded by means of special braking locomotives. A test train today consists only of the locomotive to be tested, the dynamometer car and the braking locomotive. The latter is so equipped that, independent of grade and other roadbed conditions and the weather, it is possible to obtain a constant draw-bar pull during the entire test run. The reliability surpasses that previously obtained in any other manner, and this method of operation is remarkable also for its simplicity and low cost.

It must also be mentioned that the two most important regulations covering German railway operation and traffic have been changed and came into force in their new form on October 1, 1928.

Grade Crossing Protection

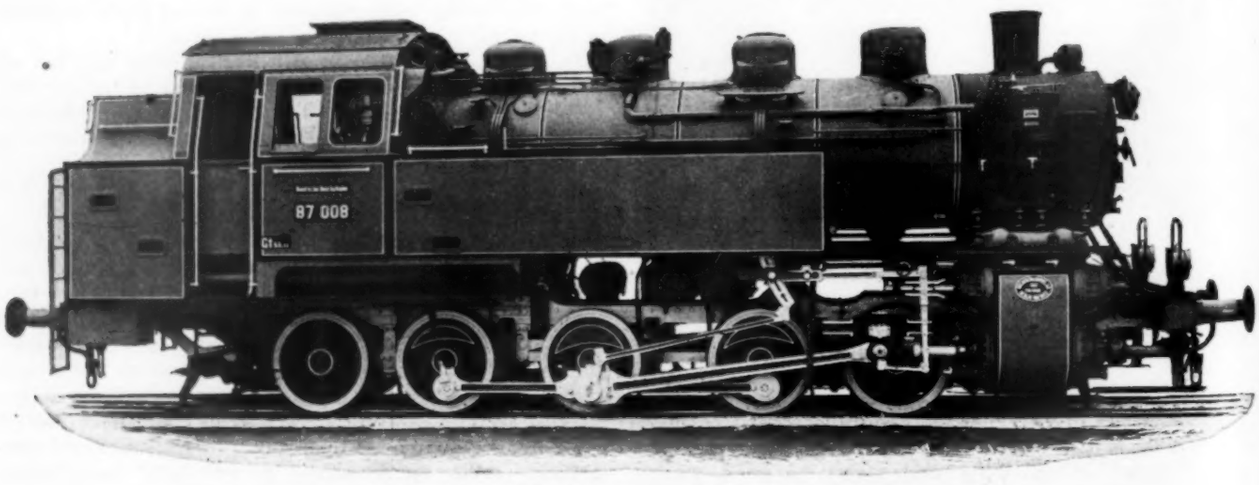
The change in the law covering operation was particularly necessary, because of the many changes resulting from the formation of the railway corporation. One of the points most disputed during the discussion of the new regulations was the question of maintaining safety at highway crossings in view of the increased automobile traffic. The decision was reached that on all main lines crossing gates must be provided at all grade crossings. On minor or branch lines the crossing with heavy traffic must be similarly provided, but gates are not necessary on these lines if the crossings permit of a good view and railroad traffic does not exceed a speed of 15 kilometers per hour. Which of these crossings are to be considered as carrying heavy traffic or permitting an unobstructed view is determined by the supervisory authorities, who are also empowered to make exceptions from the above rule in special cases. Crossings must also be provided with cross-shaped warning signs. The latter may, however, be omitted at crossings with good views, or where traffic is but slight.

The regulations covering traffic required changes owing to readjustments, beginning on October 1, 1928, in the International Railway Agreement concerning freight traffic, passenger traffic and baggage traffic. It is not possible within the scope of this article to go into details of the new traffic ordinance.

Other Improvements

In conclusion attention is called to the fact that the railway corporation, in spite of the necessary economizing, has succeeded also in the past year in improving its service. Among such improvements may be mentioned the further increase in speed, improvements in passenger cars and the introduction of the "Rheingold" train, which has enjoyed the greatest possible popularity among Germans and foreigners alike. (An article on this "Rheingold" train appeared in the *Railway Age* of September 15, page 489.) The agreements which the railway corporation has made with the Deutsch Lufthansa A. G. (German Air Transport Company) concerning the operation of air-rail service for freight and more recently also for passengers, are also to be mentioned. Freight traffic, finally, has experienced further acceleration, and the issue of a freight traffic handbook has enabled shippers to inform themselves about the best means of transportation and the time required for shipment of their goods.

All these measures and the use of an extensive solicitation for traffic enabled the railway corporation to meet the competition caused by other means of transportation, particularly trucks, in a reasonably satisfactory manner.



Newly Developed Switching Locomotive on German Railways

Golden Arrow Express Leaving North Station, Paris—Wide World Photo

French Railways Balance Budget

Increase in rates and heavier traffic bring revenues up —Taxation continues onerous

By M. Peschaud

General Secretary, Directing Committee, Large French Railways

IN 1928 the seven large French railway systems continued throughout all departments their program of reorganization and improvement undertaken after the end of the war and since the establishment of the new railway regime. Improvements have been of a character to permit the handling of greater traffic, while at the same time promoting safe operation.

Generally speaking, the railways had, in 1928, to continue their extraordinary efforts in track renewal and maintenance, since reconstruction work from the effects of the war continues heavy. A railway which before the war used 1,110,000 ties for maintenance purposes, i.e., 60 or 70 ties per kilometer (96 to 113 per mile) of track on the average, last year had to use 2,290,000 ties, or about 120 per kilometer (190 per mile).* Certain of the railways are using re-enforced concrete and metal ties more and more along with wooden ties. The increase in the weight of locomotives and trains has made necessary the placing of more ballast under the ties and the railways have been carrying on a number of tests on the quality and character of ballast.

The tendency to utilize better grades of material extends to rails and track specialties, crossovers, etc., and studies have been made with a view to making modifications in the specifications to insure the furnishing of a better grade of steel. The engineering departments of the railways have also had to make a number of changes owing to the application of the international standard clearance of 3 meters 15 centimeters (about 10 ft.). They have also had to strengthen steel bridges following the placing in service of heavy locomotives and the transportation of cars from other countries for which an axle loading of 18 metric tons is provided for 1930 and 25 tons for later on.

One of the most important post-war innovations, the telephone dispatching system, has been continually extended. Introduced into France by the administration of the American Military Railways during the war, the dispatching system has won a wide following. The number of kilometers with telephone dispatching on the Paris, Lyon & Mediterranean, for instance, rose from 207 in 1920 to 3,000 in 1928. Improvements in the system have been studied by the railways, such as the installation of portable outfits which can be rapidly transported to the place of an accident, enabling the dispatcher to be closely in touch with the situation until the resumption of normal service. The numerous and important advantages of the telephone dispatching system include a more efficient and regular movement, enabling preference to be given to the more important traffic, while increasing the speed of operation.

Extension of Automatic Signaling

Parallel with the development of dispatching there has been a continuous extension of the block signal system, as well as its improvement. Block signal sections are continually shortened, thereby becoming more numerous. Applications on single track lines proceed steadily and to maintain safety with increasing business, automatic block signaling is becoming more and more necessary on certain heavy traffic lines, particularly suburban lines.

As far as safety is concerned the wide extension of the application of repeating signals in locomotive cabs, the "crocodile" system, must be placed in the front rank. In addition, the railways have undertaken a program of completely recasting the signal system to bring about

* Similar consumption of wood for ties by the other lines has led them, because of the devastation of the French forests during the war, to make plans for obtaining wood from the Colonies. To this end they have organized a "forest consortium." In spite of the immense difficulties inherent in working equatorial forests, they have succeeded in getting under way at Gabon an organization which ought to have a considerable output in a few years.

unification and greater simplicity. The measures which the railways have taken to strengthen their track structure and to increase the installation of safety devices has had for a consequence a noticeable diminution in accidents when compared with the pre-war period, as the following figures show (the Alsace-Loraine lines are not included in the pre-war figures):

	Total Train Accidents	Killed Annual Average	Injured Annual Average
Four-Year Period before the war (1910-1913)	190	69	647
Last Four-Year Period (1924-1927)	67	43	448
Year 1927	48	31	224

The companies continued in 1928 their rolling stock improvement program retiring worn out and antiquated units and replacing them with modern equipment. This replacement explains the comparatively small increase in the totals. There has, however, been a much larger increase in power and capacity.

Increase in Equipment

The number of steam locomotives of the seven large railways rose from 20,562 on January 1, 1927, to 20,759 on January 1, 1928, but to this figure 250 electric locomotives and 423 multiple-unit motor cars should be added. The number of steam locomotives in 1914 was only 15,000. The total tractive effort of all locomotives, moreover, has increased greatly in recent years. In 1927, for instance, on the P. L. M. the increase was equivalent to 177,000 h.p., or 2.5 per cent. This increase has been the result of the modernization of existing locomotives. This policy has had a favorable affect on the regularity of train movement and on the cost of providing service, since it has made possible a reduction in the number of trains, following an increase in average train load. On another railway, for example, average net metric tons per train rose from 202 in 1913, to 327 in 1926 and to 343 in 1927.

Moreover, the increase in power of locomotives has reduced maintenance expenses, since engines rebuilt by the companies were in great need of repair which made their operation extremely expensive. The companies have carried modernization into their station practices, which has taken the form notably of platform truck operation at important stations.

The total number of freight cars rose from 546,135 on the first of January, 1927, to 547,747 on January 1, 1928; the total in 1914 was 414,900. The increase in the number of freight cars over 1914 is 32 percent, but the increase in tonnage which these cars can handle is even greater because the newer cars have greater capacity.

At present a general program of re-enforcing cars is being carried forward. Steel frames and underframes are replacing wood and a number of cars designed for particular commodities have been placed in service—refrigerator cars, hopper cars, isothermic cars, cars with low decks, etc. The railways are pressing forward actively in a program of applying steel underframes. On the Paris-Orleans, for example, up to January 1, 1928, more than 12,000 cars with wooden or composite underframes had had all-steel underframes applied, the total for the one year being 1,800. The Southern in 1927 rebuilt 34 old passenger cars and 784 old freight cars which had wooden underframes, the maintenance cost of which was becoming too heavy.

The number of passenger cars in service declined from 35,330 at the beginning of 1927 to 35,144 at the beginning of 1928 (compared with 31,504 in 1914). The number of passenger car seats, however increased in spite of the decline in the number of cars because of the placing in service of a number of larger corridor cars with four-wheel trucks. On the P. L. M., for instance, the number of cars increased 4.4 per cent by comparison with 1914, while the number of seats increased 11.3 per cent.

Steel Passenger Cars

The most outstanding feature of present-day progress is the placing in service of all-steel or composite passenger cars designed to increase safety in case of derailment or sudden stops. The number of all-metal cars now in use for all classes of passenger service has reached an imposing total. Another improvement of the post-war period has been the extension of electric lighting in passenger cars to diminish the risk of fire. The installation of electric lighting during 1928 continued in the case of suburban equipment and the program is now practically complete.

On the other hand, improvement in train heating still remains the object of study and experiment. In connection with steam heating the questions of the best pressure to maintain in the steam line and the method for controlling this pressure by the engineman have been the subject of experiment. The Eastern has undertaken to apply electric heating to a certain number of cars which have to run into foreign countries on electrified lines. In addition to these capital improvements many others are taking place, such as increased first- and second-class Pullman (parlor-dining car service, second-class sleeping cars, parlor cars with compartments for invalids and so on.

Air Brake Progress

The question of pneumatic brakes for freight trains has been the subject of long negotiations, the first proposition having been advanced by the railways on May 25, 1927. The railways, the Department of Public Works and the State Treasury Department have reached an agreement which was signed on May 16, 1928. The principal features of this agreement are the following: The total cost of the improvement is estimated at 1,600,000,000 francs ($62,720,000); the railways will assume the financing of the purchase and application of that part of this equipment which France is to supply, totaling 930,000,000 francs. The railways are authorized to order in Germany, under the head of reparation payments in kind, half of the appliances, valued at 670,000,000 francs. The French share in this undertaking is greater than the German because, while the two countries divide the manufacture of the appliances, all of the installation will be made by French industry. Already the railways have placed an order for appliances valued at 300,000,000 francs in France and for appliances valued at 50,000,000 marks in Germany. The appliances ordered both in France and Germany are of the same design. The installation of air brakes will require six years.

A number of the railways have improved their passenger terminal facilities in Paris. The State Railway completely remodelled the layout of its Saint Lazare and Montparnasse stations. The Paris-Orleans enlarged Austerlitz station. The Eastern is now rebuilding its station and has greatly enlarged its trackage facilities. The P. L. M. has improved its stations at Paris, Lyons and Marseilles.

Construction and Electrification

There have been two major projects which have just been completed which improve the railway connections

with foreign countries. One of these is the trans-Pyrenean line connecting Bedous with Canfranc and Jaca through the Somport tunnel (7800 meters—25,500 ft.—long). The Franco-Italian frontier has been penetrated by a new line running from Nice to Coni, through the Col de Brans tunnel (6000 meters long). A new line has recently been opened through the Vosges, improving transportation between Alsace and the former border departments.

Electrification

The so-called 1920 electrification program called for about 9000 kilometers (5,500 miles) of line, exclusive of the Paris suburban lines. These 9,000 kilometers are divided almost equally among the three roads closest to the French hydro-electric sites, i.e., the Southern, the Paris-Orleans and the P. L. M. At present 1066 kilometers (660 miles) of line are electrified. This is little enough in comparison with the 9,000 kilometers planned for in 1920, but it is a great deal when one takes into account the financial difficulties of the post-war period and when one considers that this figure places France in the first rank of European countries with respect to electrified mileage. The Minister of Public Works has endeavored to find a solution to the financial obstacles which hold back new work. By drawing on the reparation payments in kind it is hoped to avoid the interruption of railway electrification which is a part of the national program of engineering improvements. The next step in the electrification program calls for about 1,400 kilometers of line.

Stabilized Money a Factor in Better Business

The results of operation of the railways have been very favorable in 1928, thanks to the increase in business brought about by the stabilization of the franc and the restoration of confidence. The increase in traffic has been almost constant in comparison with corresponding periods in 1927. The total number of cars loaded for the seven large railways on November 3 had attained the figure of 19,390,465 since the first of the year, or an average of 63,161 cars a day for the first ten months of the year, as compared with 60,369 for the same period in 1927, 64,060 in 1926, 61,950 in 1925 and 59,908 in 1913. By reason of the economic crisis which followed the financial crisis, car loading began to decline in December, 1926, and this decline was accentuated until December, 1927, at which time an increase in car loading, compared with the previous year, was noted. This increase was continued in 1928, the average daily car loading having almost overtaken the level established in 1926, which latter year profited by an activity which was somewhat fictitious because of the artificial stimulus of monetary inflation.

Among the causes of increased traffic in 1928 the readjustment of the tariffs may be considered. To remedy the depression in traffic volume brought about by the weight of taxation and by highway competition, as well as railway competition, the railways on November 1, 1928, submitted proposals for the reduction of 400 different rates to the Department of Public Works.

Revenues have followed the increase in traffic and have benefited from the last general increase in rates which came into effect on March 1, 1928. Table 1 shows the gross revenues of the seven large railway systems from January 1, to November 3, 1928, with an operating kilometrage of 41,817, together with comparisons with the receipts of corresponding periods in 1927 (operating kilometrage of 41,727).

At the end of the 44th week of the present year operating revenues for all the seven large railways had exceeded those of the same period of 1927 by 1,182,000,000 francs, or 10.7 per cent. It should be borne in mind, however, that the revenues since March 1 had the benefit of the increase of 11.9 per cent in freight rates, a measure which had as its object the re-establishment of the financial equilibrium of the lines in conformance with the agreement made with the government in 1921 which set up this financial equilibrium of the railways as an obligation. As a matter of fact, the shortage in the general railway fund for 1928 was placed at one billion francs, due to the decline in traffic which was noted in the latter part of 1927 and to the increase in wages and financial charges.

Table I—Gross Revenues

	Total Receipts from January 1 to November 3, 1928 Thousands of Francs *	Increase over 1927 Per cent
State	1,773,200	10.38
P. L. M.	3,391,800	12.07
Northern	2,024,770	11.44
Paris-Orleans	1,620,899	10.23
Eastern	1,667,406	7.65
Southern	785,504	11.50
Alsace-Lorraine	935,231	10.51
	12,198,810	10.69

* The franc is stabilized at 3.92 cents.

Rates Compared With Pre-War

Railway rates in France are made up of two elements: One, "the base rate," which can be altered only within certain specified limits; the other, "general increases," which are applied alike to all tariffs and which are fixed at a rate designed to bring returns to cover all railway expenses. The "base rate" for passenger traffic has not been modified since 1914. The "general increase" applied to these rates is 240 per cent, i.e., the railways collect 340 at the present time where they collected 100 before the war. Present taxes are levied at the enormous rate of 32.5 per cent. This applies not only to the base rate but to the general increase also. Thus the price actually paid by the public is $340 \times 1.325 = 450.5$, where it paid 112 before the war. The coefficient of increase, it will be seen, is about 4. But the government's tax is 32.5 per cent in place of 12 per cent and it applies on a sum three times greater than the pre-war amount (340 instead of 100). Thus the government's share has increased nine times.

The co-efficient of the cost of living in France, as measured in francs, is five times the pre-war. Railway passengers pay four times as much for transportation, but of this increase the railways receive only 3.4.

The base rate for freight traffic is placed at 140 per cent. The general increase in affect at the present time is 370 per cent. The charges collected are thus $140 \times 4.7 = 658$ as compared with 100 in 1914, not counting the tax. The tax averages 7.7 per cent. Thus, taking 6.58 times $1.077 = 7.086$, which is the coefficient of present-day freight rates as compared with those of pre-war days.

Therefore in spite of the heavy charges which the railways levy, their resources have been only slightly improved. Measured in gold, their passenger rates are only 68 per cent (not counting taxes) or 82 per cent (including taxes) of the rates charged in pre-war days and their freight rates, on a gold basis, are only 23 per cent (not including taxes) or 35 per cent (including taxes) above the pre-war rates. These increases are among the lowest in Europe.

The writer can not close this brief discussion of the

French railway situation without a few words on the subject of highway competition, which is one of the most outstanding phenomena of the present situation in France, as in every other country. Free from regulation which controls railway rates, not sharing in the cost of building or maintaining the right-of-way it uses, not a party to the heavy taxation which weighs down the railways, the automobile, aside from all other consideration, has a tremendous advantage. The loss suffered by the railways is difficult to measure because of the lack of complete data. The only information available is a few statistics relating to highway common carriers, which are far from representing the total loss to the railways.

Railways Organizing Highway Subsidiaries

The railways have been disturbed by this competition and they are meeting it temporarily by certain changes in their pasenger rates, i.e., providing round-trip and season tickets for popular watering places, excursion tickets to the principal tourist regions, an increase in the duration of validity of round-trip tickets, greater liberality in connection with family tickets, the sale of cards for one or two-month periods, entitling the holder to travel at half-fare, etc. They are concerning themselves also with making changes in the handling of trains, classification of cars, and the development of schedules for freight service. But it is by themselves entering into highway service, or perhaps by coming to some agreement with existing highway operations, that the railways have decided to meet this serious competition. All of the large railway systems have in the last few months set up subsidiary highway companies.

Earnings Will Equal Expenses

The year 1927 closed with a deficit for all the large railway systems of 250,000,000 francs, not including 500,000,000 francs interest on loans issued to cover deficits in the years 1921 to 1926. The 1927 deficit would have been much less important if the railways had not reduced by every possible means their operating expenses. However, the means by which the railways could do this were limited. They could not do much with the wage bill which represents 57 per cent of operating expenses. Wage costs were augmented by 572,000,000 francs as a result of the increases which went into effect on March 1, 1928. Nevertheless, thanks to the increase in traffic which occurred in 1928, thanks to constant economies, the year will close, so it appears, with expenses and earnings in equilibrium. It may not be without interest to show here how the railway charges were divided in 1927. In that year the railways worked:

Four and a half months to pay the wages of the statutory personnel and only two days for staff salaries.
One month to pay for fuel.
Two-and-a-half months to pay operating expenses.
Two months to pay taxes.
One-and-a-half months to pay interest on outstanding indebtedness.
Fifteen days for the amortization of debt.
Lastly, four days for stockholders' dividends and scarcely an hour for the remuneration of the boards of directors.

Budget Balanced

One fact in the situation of the French railways stands out prominently and makes it possible to judge the business ability of the railways: They continue to operate and have come to the point where they are able to balance their income with their expenses, while at the same time they are pouring into the coffers of the state many billions of francs in the form of taxes and other concessions. In 1927 the total of these taxes turned over by the railways was 2.5 billion francs, which compares with total revenues of 13 billions. Since 1913 the tax payments of the railways have increased in the unbelievable proportion to 1124 per cent and in the budget for 1928 the taxes on transportation alone are set down at more than two billion francs. Thus one can see that the French railways would be highly profitable if the formidable taxes which weigh on them were alleviated somewhat and if their financial charges should be reduced in the future by a lower interest rate. It is well to note that before the war the cost of capital for the large French railways was about 4½ per cent, whereas now, in spite of the improvement in the financial situation brought about in 1928, the rate is still about double what it was before the war.

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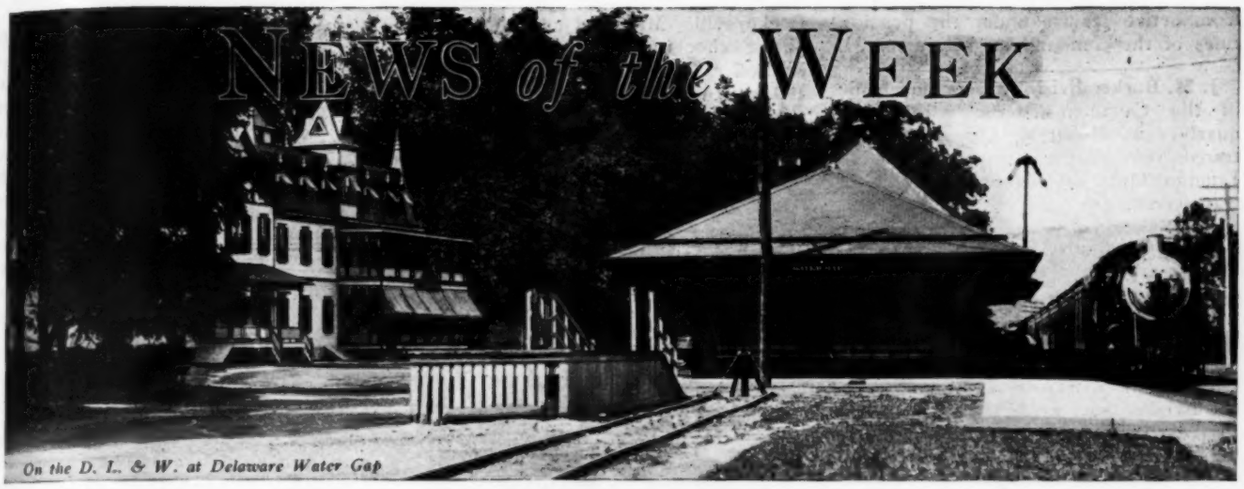
A Freight Train on the German State Railways

NEWS of the WEEK



On the D. L. & W. at Delaware Water Gap

THE PUBLIC UTILITIES COMMISSION OF COLORADO has refused the application of the Public Service Company of Colorado for permission to construct a hydro electric power plant in the Royal Gorge of the Arkansas river near Canon city, Colo., which was opposed by the Denver & Rio Grande Western. The commission held that the damage to the scenic attractions in the gorge by reason of the construction of the plant would far outweigh any economic factors such as lower electric power rates which it was not shown by the public service company would be reduced.

GROSS REVENUES OF THE FOUR PRINCIPAL BRITISH RAILWAYS decreased by approximately $38,000,000 during the first 10 months of 1928 as compared with the corresponding 1927 period, according to recent reports published by the United States Department of Commerce.

The largest decrease was reported by the London, Midland & Scottish, since approximately half of the foregoing total of reduced revenues or $18,000,000 was the reduction incurred by this road. Of this L. M. S. revenue loss approximately $9,100,000 was on merchandise traffic, $5,500,000 on coal traffic and $2,500,000 on passenger traffic.

Construction

CHICAGO, ROCK ISLAND & PACIFIC.—The citizens of Liberal, Kan., have voted in favor of the issuance of $30,000 of bonds which will be used to provide a right-of-way for this company's Liberal-Gruver (Tex.) extension at Liberal.

GRAND TRUNK WESTERN.—An agreement has been reached between this railroad the Eastern Michigan (electric) and the City of Pontiac, Mich., which will enable the Grand Trunk to proceed with the construction of its belt line around that city. It provides for the separation of grades at South Boulevard and Auburn, Featherstone, Mt. Clemens, Joslyn, and Kenneth roads. It also provides for separation of grades within the next 10 years at the West Huron, Johnson, Saginaw, Wilson and South Boulevard Crossings of the Detroit, Grandhaven & Milwaukee and at the Baldwin avenue crossing of the Pontiac Oxford & Northern.

PORT TERMINAL ASSOCIATION.—A contract for the construction of about one and one-half miles of trackage along the ship channel at Houston, Tex. has been let to B. P. Panas at a cost of $26,300.

WESTERN PACIFIC.—The Interstate Commission hearing on the application of the Western Pacific, California, for the construction of a line from Nilegarden, Cal., to Fresno has been scheduled for Fresno on January 10, and for San Francisco on January 17.

Financial

DETROIT, GRAND HAVEN & MILWAUKEE.—*Trackage Rights.*—This company has applied to the Interstate Commerce Commission for a certificate authorizing it to operate under trackage rights over lines of the Pennsylvania, the Muskegon Railway & Navigation Company and the Toledo, Saginaw & Muskegon, from Kinney to Muskegon, Mich.

ELKHART & SANTA FE.—*Bonds.*—The Interstate Commerce Commission has authorized this company to issue to the Atchison, Topeka & Santa Fe a $1,700,000 first mortgage 6 percent bond in payment of indebtedness.

MOBILE & OHIO.—*New Director.*—Frederic J. Fuller vice president of the Central Union Trust Company, New York has been elected a director of this company.

PITTSBURGH & WEST VIRGINIA.—*Acquisition of West Side Belt.*—The Interstate Commerce Commission has issued a certificate under section 1 of the commerce act authorizing this company to acquire the lines of railroad of the West Side Belt, the stock of which it owns, on condition that the acquisition of the properties be recorded in its books at the cost of acquisition to it, in accordance with the commission's accounting classifications, instead of at the book value shown in the books of the Belt company. The report says it appears clear that under any possible grouping of the railroads in a consolidation plan the relationship between the applicant and the West Side Belt would not be disturbed. Commissioner Eastman wrote a long dissenting, opinion in which Commissioner McManamy joined, on the ground that the acquisition proposed is a "consolidation" of the kind not authorized by the law except in compliance with section 5. In 1921 Division 4 of the commission dismissed an application of the P. & W. V. for a certificate for the acquisition and operation by it of the line of W. S. B. Authority also was granted the P. & W. V. to assume obligation and liability in respect of $7,000,000 of first mortgage bonds of the W. S. B. and $3,104,000 of first mortgage bonds of the Pittsburgh Terminal Coal Corporation.

RAILWAY EXPRESS AGENCY, INCORPORATED.—*Securities.*—This company and W. B. Storey, W. W. Atterbury, P. E. Crowley and C. R. Gray, as agents for the participating railroads have applied to the Interstate Commerce Commission for authority for the railroads to acquire control of the Express Agency by purchase of its 1,000 shares of stock at $100 a share and for the Express Agency to issue the stock and $35,000,000 of debenture bonds, the proceeds to be used in acquiring the property of the American Railway Express Company, under an agreement in process of formulation at an approximate cost of $30,000,000.

Officers

Fred. B. Miller resigned as president of the Laramie, North Park & Western with headquarters at Laramie, Wyo., on January 1, because of ill health.

William Hodson retired from active service as assistant treasurer of the Chicago, Rock Island & Pacific, with headquarters at Chicago, on December 31, upon reaching the age of 70 years.

Charles R. Peddle, assistant purchasing agent of the Pennsylvania, with headquarters at St. Louis, Mo., retired

from active service under the pension rules of the company on December 31.

J. M. Burke, division master mechanic of the Canadian Pacific with headquarters at Montreal, Que., has been transferred in the same capacity to London, Ont., succeeding **H. M. Smith**, transferred.

J. S. Allen, master mechanic of the Ottawa division of the Canadian Pacific, has been appointed master mechanic of the Montreal terminals, succeeding **J. M. Burke**, transferred. **R. V. Carleton**, division master mechanic at Schreiber, Ont., has been transferred to the Ottawa division, succeeding Mr. Allen.

J. D. Rahaley, division superintendent of the Erie, with headquarters at Salamanca, N. Y., has been appointed superintendent of the Susquehanna and Tioga divisions, with headquarters at Hornell, N. Y. **F. J. Tamplin**, assistant division superintendent at Youngstown, O., has been appointed superintendent of the Allegany and Bradford divisions.

C. F. Smith, general superintendent of passenger transportation of the New York Central, with headquarters at New York, has been appointed manager of passenger transportation, with the same headquarters. **G. Metzman**, transportation assistant to the president, with headquarters at New York, has been appointed manager of freight transportation, with the same headquarters.

Fred. E. Lagerholm, who has been appointed assistant to the president of the Durham & Southern, with headquarters at Charlotte, N. C., was born on August 5, 1891, in Brooklyn, N. Y. He entered railway service with the Southern in November, 1906, as clerk and stenographer, later serving as chief-dispatcher and trainmaster and in various other positions on the Charlotte division of the Southern. From 1912 to 1914 he served as secretary to the general superintendent of the Eastern district and from the latter date until 1917 he was chief clerk to the division superintendent of the Charlotte division. Mr. Lagerholm resigned from the service of the Southern in February, 1917, to accept the position of chief clerk to the vice-president and general manager of the Piedmont & Northern, in which position he remained until 1923, when he was promoted to assistant to the vice-president, which position he holds at the present time. On June 1, 1923, he was appointed assistant to the vice-president of the Durham & Southern and on December 8, 1928, he was promoted to the position of assistant to the president.

Walter V. Shipley, general passenger agent of the Baltimore & Ohio, with headquarters at New York, has been appointed passenger traffic manager of the Central of New Jersey, with headquarters at the same point. Mr. Shipley was born on November 1, 1883, at Cockeysville, Md., and educated in the public schools and business college. He entered railway service on October 25, 1902, with the Baltimore & Ohio and until July 1, 1911, was stenographer to the auditor of merchandise receipts.

Walter V. Shipley

From the latter date until November, 1915, he was traveling tariff inspector in the office of the first vice-president of the same road. He then became traveling passenger agent, with headquarters at Baltimore, which position he held until March, 1920, when he was promoted to the position of division passenger agent at Washington, D. C. Mr. Shipley was appointed assistant general passenger agent on October 1, 1923, with the same headquarters, which position he held until November, 1926, when he was appointed general passenger agent, serving in that capacity until his recent appointment as passenger traffic manager of the Jersey Central.

W. C. Hope, passenger traffic manager of the Central of New Jersey, with headquarters at New York, will retire on January 1, after 50 years continuous service with that company. Mr. Hope was born on June 13, 1859, at Somerville, N. J. He was educated at Wyckoff's Preparatory School, Elizabeth, N. J., and Dr. Chapin's Collegiate School, New York. He began railway work with the Central of New Jersey on May 1, 1878, as a clerk in the passenger department, serving successively in various minor capacities until his promotion to chief clerk. He was later advanced to the position of assistant general passenger agent and general passenger agent. On March 1, 1920, he was appointed passenger traffic manager of the system. During the period of Federal control, from 1918 to 1920, Mr. Hope was passenger traffic manager of the joint Jersey Central and Reading lines. For the past 17 years he has been secretary of the American Association of Passenger Traffic Officers.

W. C. Hope

Obituary

Lewis A. Robinson, who was to have retired from active railway service on January 1, as comptroller of the Chicago & North Western, died at his home in Chicago on December 28, from a heart attack.

Harry L. Miller, president of the Interstate Railroad Company, died recently after a brief illness. Mr. Miller was born on July 31, 1872, at Huntsville, Ala. He was educated at Howard College, East Lake, Ala., and entered railway service on May 1, 1892, as secretary to the general freight agent of the Georgia Pacific division of the Richmond & Danville. From November 1, 1895, to November 30, 1898, he was secretary to the traffic manager of the Southern, then being appointed soliciting agent at Richmond, Va. He served as traveling freight agent from September, 1899, to December, 1902, with headquarters at Atlanta, Ga. From January 1, to June 30, 1903, he was commercial agent at Chattanooga, Tenn., being appointed division freight agent at Knoxville, Tenn., on the latter date. He was promoted to assistant general freight agent in 1906 and the following year he was appointed general freight agent of the Knoxville and Asheville traffic divisions of the same road. Mr. Miller was appointed president of the Interstate Railroad in November, 1914, serving in that capacity until December 1928, when he retired.

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On the Great Northern